Statistics and Indicators on the Labour market in the eEconomy

Mobility in the eEconomy

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With core funding from the European Commission's Information Society Technologies (IST) Programme and Eurostat (IST-2000-31099)

Colophon

CIP Koninklijke Bibliotheek Albert I

Mobility in the eEconomy. / Alex Stimpson & Maarten Tielens. - Leuven: Katholieke Universiteit Leuven. Hoger instituut voor de arbeid (STILE Project), 2004, 198 p.

ISBN 90-5550-389-4.
D/2004/4718/31.

Layout design: Sandra Volders
Word processing: Evy Van Dael & Sandra Volders
Cover design: Rudy De Wit

Preface

Over the last decade there has been a fundamental shift in gear in the deployment of the Information Society. The supply of ICT is in the process of transforming whole industries, creates a new globally traded economy and is fuelling ever-faster technology innovation. It is obvious that the use of ICTs now cuts across all sectors, industries, and boundaries and supplies the essential underpinning of the Information Society. In this new environment, occupations and businesses, production and work processes, and the labour market in general are undergoing fundamental changes as well. Some will gain from this evolution, but for others participation in the new economy is a jump too hard to make. How can we assess the changes in work and identify the winners and the losers? How can new trends be measured and benchmarked in a European perspective - recognising that the economy today and increasingly in the future crosses all boundaries?

With funding from the European Commission's Information Society Technology (IST) Programme in collaboration with Eurostat, the STILE project (Statistics and Indicators on the Labour Market in the *e*Economy) was set up to provide innovative methodologies and content for the statistical monitoring of the European labour market in the *e*Economy. The starting point of STILE was that the available indicators and instruments to monitoring these fundamental shifts are not always adequate. It seems that it is not a matter of lack of data or information, nor of the absence of a 'statistical system'. Rather, the existing instruments and data are not capable anymore to grasp the multifacetted dimensions of the shift towards an Information Society, nor that they can keep pace with the fast evolutions. The statistical system has not adapted to the reality of the Information Society of today and tomorrow. Further, the value of statistics in guiding policies that accommodate to new trends is not always fully recognised.

An adequate statistical monitoring of the labour market, that allows monitoring who is working where and under what conditions, and how working patterns evolve across national boundaries, is however of strategic importance because it serves the efficient functioning of the labour markets. This is all the more crucial in a unified and enlarged Europe, where diversity still seems to be the standard and policy requires more than ever a common understanding. This persisting diversity requires validated and comparative indicators that allow monitoring and benchmarking the deployment of the Information Society from a regional perspective. To contribute to this was the key objective of the STILE project.

Six different studies were carried out by the ten expert STILE partners, that worked together in a constructive and collaborative way during the three project years (2001-2004). This resulted in six separate reports, such as the one that is presented here, and each of them covers a different dimension of the Information Society measurement. The list of all STILE reports and related publications is included at the end of this report.

To realise this work, STILE worked closely with national statistics offices and policy stakeholders and developed an explicit strategy of involving users in a systematic and direct way to formulate strategies for European convergence in the statistical monitoring of the labour market.

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Table of contents

Chapter 1

Introduction

This final report for this workpackage of the STILE project, entitled *Mobility in the eEconomy*, has sought to reveal determinants of the mobility of ICT workers, to detail the inflow and outflow of ICT workers mobility and to look at the effect gender, age and educational background have on the ICT jobs being created. Two principal sources have been used to do so: the Labour Force Survey (LFS) and the Belgian Datawarehouse Labour Market of administrative data (DWH). This is the quantitative part of the report.

A quantitative assessment, however, needs to be accompanied by a more qualitative and methodological evaluation, an exercise that was illuminated by a detailed examination of the data from the two sources as it led to a number of additional insights and questions.

Essentially, and in line with overall STILE project goals, this workpackage has aimed to 'innovate methodologies for the statistical monitoring of the European labour market in the *e*Economy'. By looking to develop the methods for exploiting Labour Force Survey data for measuring mobility in the *e*Economy as well as testing the possibilities of other existing sources, this work is of particular relevance to the IST programme objective: Cross-Programme Action 8 'Statistical tools, methods, indicators and applications for the Information Society' and its focus on 'statistical disclosure control and improvement in quality and in timely and low-cost data production'.

1.1 Policy context of the report

According to a recent Commission Action Plan, fostering growth in the European economy calls for better matching between the skills demanded in the growth sectors and regions and those available in the work force, ... This requires more mobility of capital and of labour, in pursuit of the twin objectives of a successful and dynamic European economy and a balanced geographical and social distribution of the rewards of faster economic growth (Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions, 2002a).

Such a policy development is to a large extent linked to the ambitious and overriding goal that the European Union set itself at the Lisbon European Council meeting held in March 2000. This goal was 'to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion' (European Council, 2000).

When the *Action Plan for Skills and Mobility was* subsequently adopted at the Barcelona summit in 2002, the Council also called upon government, business and

workers themselves to do more to equip workers for occupational mobility and better jobs and to accelerate efforts to ensure geographical mobility and a high-performance labour market.[1]

At the same time, this *Action Plan for Skills and Mobility* also called for greater occupational mobility in order to adapt to structural change, driving such change in a competitive world (and) contributing to a better functioning of labour markets and higher productivity, employment, growth and competitiveness.

But *Mobility in the eEconomy* is not only relevant to the Lisbon and Barcelona processes of interest to analysts, policymakers and the business community alike. It is also inextricably linked to the growth and characteristics of employment in the Information, Communication and Technology sector and, as such, key European Union policy developments such as the *eEurope Action Plan* (Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions, 2002b).

A better understanding of the growth and flows in the ICT branch is therefore important. Demographic factors, business cycles and rapid technological change increasingly result in quantitative and qualitative imbalances in the supply of skilled labour (Career Space, 2001). Looking at the flows of ICT workers - where are they coming from and where are they going to - should help to highlight the skills mismatch in the demand for, and supply of, ICT workers. Furthermore, it should help to answer whether new workers in ICT sectors have the appropriate skills base. Before younger workers have spent a significant period of time in the work force, their education will be their principle form of training. If ICT branches are attracting an increasing amount of new and younger workers, do these new recruits tend to have a high level of education or are they attracted to the ICT sector from a variety of educational backgrounds?

But these are just a few of many aspects. An appreciation of the mobility of personnel between ICT and other economic branches is important when developing indicators concerning the potential knowledge about the Information Society. For it is not only the people working in the ICT sector that have knowledge about the sector, but also people who have formerly worked in the ICT sector. It is therefore important to gain an idea of the level of this 'knowledge transfer' and the degree to which it differs between countries. Where, for example, does it go, and is a high degree of intersectoral mobility a result of good transferability of skills or of unfavourable working conditions and uninteresting work?

Providing information and recommendations to the European Commission on the better measurement of mobility in the *e*Economy is therefore important. But it is also of interest to provide data on key related socio-economic reference indicators. After all, social inclusion and equal opportunities in a knowledge-based society are explicit objectives of the *eEurope Action Plan.*

1.2 Objectives

Taking into consideration these areas of interest surrounding the ICT sector, one objective of this report has been to see to what extent the inflows and outflows of ICT workers as well as their destination sectors can be detailed using the EU LFS and the Belgian Datawarehouse. The aim being a better understanding of the knowledge flows in and around the ICT sector as well as of the distribution of Information Society Knowledge.

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1 http://europa.eu.int/Comm/Employment_Social/News/2002/Feb/034_En.html.

However, information on ICT workers, their mobility and other socio-economic factors is only telling when it is evaluated in contrast with something else. In other words, the information needs to be analysed and compared with other suitable references such as the economy as a whole, other manufacturing or service sectors, various age groups, etc., and to that end emphasis is also placed on background analysis. This includes looking at the effect gender, age and educational background have on the ICT jobs being created, comparing this to other sectors of importance and the economy as a whole.

For such an analysis, this report has explored the possibilities to use the EU LFS and the Belgian Datawarehouse for:

- determining flows within the ICT sector and between ICT and other branches by regrouping the economic destination sectors of ICT personnel into broad categories;
- looking at the skills base of the inflows of younger people into the ICT sector;
- linking this to more general measurements of employment growth in the ICT sector, by gender, age or type of occupation;
- describing the ICT sector in Belgium in terms of its personnel.

Mobility in the eEconomy provides results for the European Union (including the new Member States), EFTA and the other Candidate Countries for which data is available. Special focus at a detailed level is placed on ICT mobility in Belgium. The data used to build up the indicators follows established nomenclature and internationally standardised definitions.

Quite apart from nomenclature, there are a number of other methodological factors that need to be taken into consideration for assessing the degree to which the EU LFS and the Belgian DWH is a suitable source for measuring ICT sector mobility. Apart from some general issues, the main criteria need to be its accuracy in measuring ICT and its suitability for measuring the dynamics of employment change. This report therefore also provides an in-depth insight into the methodological questions surrounding the measurement of ICT mobility using the EU LFS and the DWH.

1.3 Synergies and clustering

This report has benefited from the research carried out in various other STILE workpackages. Notably, the interrelated work on the workpackage, which looked at extending the coding used in current national LFS surveys, the research carried out for the workpackage on NACE and ISCO classifications of *e*Business and *e*Workers and also that of the workpackage, which created and tested an ad hoc module to measure telework.

As well as drawing on the experiences gained through other workpackages in the STILE project, and also feeding into others, efforts were made to cluster with another project funded by the European Commission under its Information Society Technologies programme. Agreements were made between the STILE and NESIS (New Economy Statistical Information System) projects on consistent methodological approaches to ensure that comparison of results between the two could be more easily achieved.

1.4 Structure of the report

The remainder of the report is structured as follows. Chapter 2 looks at the choices and challenges of measuring mobility in the *e*Economy, providing the methodological information necessary for such an analysis. Chapter 3 looks at ICT sector employment and growth, focusing first on Belgium and then on Europe more generally. The next chapter concentrates on gender and age, highlighting the differences evident between the sexes on the one hand and the young and the old on the other. Chapter 5 details the current situation as well as the development of working patterns and conditions in the ICT sector. Chapters 6 to 8 look at mobility, looking first at inflows into and outflows from the ICT sector, second at job-to-job mobility and third sectoral flows, which details where workers are coming from and where, when they leave the ICT sector, they are likely to go. In the light of the analytical evidence, Chapter 9 reviews the methodology and data sources used and looks in more detail at quality issues related to the use of the EU LFS and the Belgian DWH. In so doing, it confronts the indicators from the two sources and where there are differences suggests possible reasons and potential improvements. Chapter 10 concludes and provides recommendations to the Commission concerning the measurement of mobility in the *e*Economy.

Chapter
2

Measuring mobility in the ICT sector: choices and challenges

One of the key concerns for a project such as STILE is to provide data, analysis and recommendations that are not just instructive on a stand-alone basis, but can also be viewed in a wider context and in comparison with related research. In order to do so, it is important that the methodological basis used, the concepts developed and the definitions employed are either rooted in or can be broadly applied to an existing set of international standards and references. This has been one of the starting points for *Mobility in the eEconomy*.

That said, most statistical projects face a dilemma between what ideally should be measured and what, in reality, can be. And so while every effort has been made to maintain full comparability with international references, in some cases the level of data availability offered by the source means that certain deviations have been necessary. We will see that the overriding issue in this context has been the definition adopted for the ICT sector, as reviewed later.

This chapter therefore provides an introduction to the methodological considerations of using the EU LFS or the DWH for measuring mobility in the *e*Economy. As such, it concentrates on several aspects. The first is the sources used to calculate ICT sector mobility, the second the approach taken to define the ICT sector and the implications that this definition may have on the results. Third, a number of different approaches to calculating mobility are described, before the definition of knowledge is considered.

2.1 An introduction to the Datawarehouse and the EU LFS

2.1.1 The Datawarehouse Labour Market

The Datawarehouse Labour Market is a database in which a series of social data from a number of social security institutions are permanently linked.[2] The data files of these institutions are related to one another via the (coded) personal identification number which every person has for their social security (INSZ). The individuals are therefore the most important statistical unit. Each participating social security institution offers an extensive list of variables in the Datawarehouse, such as the NACE code. For persons in employment, the characteristics of the employment regime, the employer and the number of hours worked are also integrated in the Datawarehouse,

2 We are grateful to the Belgian Kruispuntbank Sociale Zekerheid for allowing us to use the Datawarehouse Labour Market for this project.

a fact which makes statistics about jobs, employers and employment volume possible.

The population of the Datawarehouse consists of all persons who during one quarter were known to one of the institutions involved. Added to these are the individuals' family members (in as far as these are not known themselves by one of the participating institutions). Of the latter group we merely know the sex, the age and the home address.

In terms of the labour force, the Datawarehouse therefore comprises the majority of working inhabitants of Belgium and a large part of the unemployed. Missing from the group of employed are especially the employees who are working for an employer who is not required to contribute to the Belgian social security, such as frontier workers employed abroad. Of the total population of unemployed, the individuals who are not - be it directly or indirectly - entitled to unemployment benefit remain beyond the scope of the Datawarehouse.

On the basis of the information from the participating social security institutions, a detailed division of the population by labour status is drawn up in the Datawarehouse. Thereby the situation on the last day of the quarter is systematically taken into consideration.

The nomenclature of these socio-economic positions is built up hierarchically and can be broken down to a five digit level. This allows for a far-reaching division within the four major categories. The new possibilities of the Datawarehouse are exploited to the full by mapping positions for which different social security institutions provide the information (i.e. persons who are both employees and self-employed). As an illustration this is shown in Table 2.1 at the three digit level.

Table 2.1 Datawarehouse Labour Market: overview of the socio-economic nomenclature

Code and description of the socio-economic position
Total
1. Employed
1.1 Employee
1.1.1 In a single employment
1.1.2 In several jobs
1.2 Self-employed
1.2.1 Main occupation
1.2.2 Secondary occupation
1.2.3 Self-employed after retirement age
1.3 Helping an employer who is self-employed
1.3.1 Employed as helper as main occupation
1.3.2 Employed as helper as secondary occupation
1.3.3 Employed as helper after retirement age
1.4 Employee and self-employed
1.4.1 Mainly employee
1.4.2 Mainly self-employed
2. Unemployed (with benefits)
2.0.1 Unemployed after full-time employment
2.0.2 Unemployed after studies, qualifying for 'waiting benefit'
2.0.3 Unemployed after a voluntary part-time job
2.0.4 Unemployed after graduation, entitled to a 'bridging benefit'
2.0.5 Unemployed without benefit (new status)

Table 2.1 Datawarehouse Labour Market: overview of the socio-economic nomenclature. Continued

Code and description of the socio-economic position
Total
3. Inactive (with benefits)
3.0.1 Full-time early retirement
3.0.2 Full-time career break
3.0.3 Exemption from registration as unemployed
4. Unknown
4.0.1 Suspended unemployed
4.0.2 Other

Source: KSZ-DWH Labour market data (Processing Steunpunt WAV)

2.1.2 The European Union Labour Force Survey

The European Union Labour Force Survey[3] is essentially a centralised way of collecting harmonised and comparable data. The main statistical objective of the EU Labour Force Survey is to divide the population of working-age (15 years and above) into three mutually exclusive and exhaustive groups (persons in employment, unemployed persons and inactive persons) and to provide descriptive and explanatory data on each of these categories. The definitions of employment and unemployment used in the EU LFS closely follow those adopted by the 13th International Conference of Labour Statisticians.

The technical aspects of the implementation of the survey are laid down in agreement with the National Statistical Institutes. On the basis of proposals from Eurostat, the Working Party on the Labour Force Sample Survey determines the content of the survey, the Community list of questions and the common coding of individual replies, as well as the principal definitions to be applied for the analysis of the results.

The National Statistical Institutes are responsible for selecting the sample, preparing the questionnaires, conducting the direct interviews among households, and forwarding the results to Eurostat in accordance with the common coding scheme.

The labour force characteristics of each person interviewed refer to their situation in a particular week. The survey is intended to cover the whole of the resident population, i.e. all persons whose usual place of residence is in the territory of the Member States of the Community, the EEA or the various candidate countries.

For technical and methodological reasons, however, it is not possible in all countries to include the population living in collective households, i.e. persons living in homes, boarding schools, hospitals, religious institutions, workers' hostels, etc.

Consequently, for the purposes of harmonising the field of the survey, results are compiled for the population of private households only. The main units of measurement for which results are obtained from the survey are individuals and households. The definition of a household varies somewhat from country to country but these differences are unlikely in the majority of cases to have a significant effect on the comparability of the results.

3 This information and more can be found in Eurostat, 2001.

2.2 Capturing the *e*Economy: defining the ICT sector

2.2.1 Capturing the *e*Economy: choices and challenges

Information and Communication Technology, or ICT, provides the basis for measuring the *e*Economy. Though there are a number of different definitions around for ICT, *Mobility in the eEconomy* broadly follows that agreed by the OECD Working Party on Indicators for the Information Society. In its subsequent publication, *Measuring the ICT sector* (OECD, 2000), the OECD details the definition of ICT as described in Table 2.2, where some ICT subsectors at the class level (four digit)[4] are included.

Table 2.2 OECD Definition of ICT by sector of activity (NACE/ISIC)

Description	ISIC Rev. 3	NACE Rev. 1.1
Office, accounting and computing machinery	3000	30
Insulated wire and cable	3130	31.3
Electronic valves and tubes and other electronic components	3210	32.1
Television and radio transmitters and apparatus for line telephony and line telegraphy	3220	32.2
Television and radio receivers, sound or video recording or reproducing apparatus, and associated goods	3230	32.3
Instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process equipment	3312	33.2
Industrial process control equipment	3313	33.3
Wholesaling of machinery, equipment and supplies*	5150	51.6
Telecommunications	6420	64.2
Renting of office machinery and equipment (including computers)	7123	71.33
Computer and related activities	72	72

* Where possible, this should be limited to the wholesaling of ICT goods, *Measuring the ICT sector*, OECD, 2000.
Source: Measuring the ICT sector, OECD, 2000

This classification is based on the principle that products in the manufacturing sector:
- must be intended to fulfil the function of information processing and communication including transmission and display;
- must use electronic processing to detect, measure and/or record physical phenomena and communication by electronic means;

and that products in the service sector:
- must be intended to enable the function of information processing and communications by electronic means.

The definition in Table 2.2 requires information at the three digit and sometimes four digit level of NACE. At project start, however, Labour Force Survey (LFS) data was available at the broader two digit (i.e. NACE 32), and for a minority of countries, three digit level of NACE (i.e. NACE 32.1). To ensure comparable data for a maximum number of countries, the starting point has to be NACE at the two digit level. But this

4 NACE Rev. 1.1 is organised hierarchically into five levels. From the broadest to the most detailed, they are (i) sections, (ii) subsections, (iii) divisions, (iv) groups, (v) classes. In this report, we are most concerned with division (two digit level) and groups (three digit level).

entails choices being made concerning the inclusion of NACE sectors at the two digit level on the basis of the existence of ICT in some of its subsectors. If ICT indicators are to be compared across all countries for which LFS data was, at project start, available at Eurostat, then LFS data will not be able to provide an exact measurement of ICT according to the OECD definition. In adapting the definition slightly, care must be taken not to inflate the definition of ICT, while on the other hand ensuring that the size of the population in the approximation does not increase sampling variation to the extent that it loses the representativeness of the population in question.

For this reason, certain subsectors have been excluded from ICT compared to the OECD definition due to the expected difficulty in accurately measuring total ICT employment. To judge on whether a NACE sector should subsequently be included or excluded, an extraction of data was made from Eurostat's Structural Business Statistics (SBS) database, which has data at the three and four digit level of NACE. The share of employed people in the three digit sector (or group of three digit sectors) was then calculated against the two digit level to see to what extent overrepresentation of individuals would result from the inclusion of the two digit level sector i.e. employment in NACE 33.2 and NACE 33.3 as a share of NACE 33.

On this basis, *manufacture of electrical machinery and apparatus n.e.c.* (NACE 31) has been excluded from the definition of ICT since *manufacture of insulated wire and cable* (NACE 31.3) accounted for under 20% of employment in NACE 31 for the majority of reporting countries between 1996 and 2000. Similarly, *wholesale of machinery, equipment and supplies* (NACE 51.6) only accounted for under 30% of employment in *wholesale trade and commission trade, except motor vehicles and motorcycles* (NACE 51). To meet the OECD definition, *renting of office machinery and equipment (including computers)* is required at the NACE four digit level (NACE 71.33). This level of detail for NACE 71 is infrequently reported in the SBS, but what evidence there is suggests that it accounts for a negligible employment share, and for this reason it has also been excluded.

But while the inclusion of these NACE two digit sectors would have incorporated non-ICT workers into the ICT cohort, at the same time their omission means that certain individuals have been excluded from what, following the OECD definition, would be workers in the ICT sector.

To a certain extent, this is 'corrected' by the inclusion of NACE 33 and NACE 64 at the two digit level.[5] In the first of these, NACE 33, though only m*anufacture of television and radio transmitters and apparatus for line telephony and line telegraphy* (NACE 33.2) and *manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods* (NACE 33.3) are in the ICT definition, according to the SBS data, their employment share generally represents between 40 and 60%. *Telecommunications* (NACE 64.2), meanwhile, is very often the most important ICT subsector in the economy and its omission would not only mean excluding a large number of workers, but would also mean that any subsequent analysis would neglect this very significant facet of the ICT cohort.

As a result, the starting point for data coming from the Labour Force Survey has been the following definition of ICT:

5 Section 9.1 tests the effect of adopting this definition of ICT for those countries supplying EU LFS data at the NACE three digit level.

Table 2.3 Definition of ICT followed in this report

NACE Rev. 1.1	Description
30	**Manufacture of office machinery and computers**
30.0	Manufacture of office machinery and computers
30.010	Manufacture of office machinery
30.020	Manufacture of computers and other information processing
32	**Manufacture of radio, television and communication equipment and apparatus**
32.1	Manufacture of electronic valves and tubes and other electronic components
32.2	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
32.201	Manufacture of TV and radio transmitters
32.202	Manufacture of apparatus for line telephony and line telegraphy
32.3	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
33	**Manufacture of medical, precision and optical instruments, watches and clocks**
33.1	*Manufacture of medical and surgical equipment and orthopaedic appliances*
33.101	*Manufacture of electrical apparatus for medicine, dentistry and veterinary medicine*
33.102	*Manufacture of non-electrical apparatus and instruments for medicine, dentistry and veterinary medicine*
33.103	*Manufacture of orthopaedic appliances*
33.2	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
33.201	Manufacture of electrical instruments and appliances for measuring, checking, testing, navigating and other purposes
33.202	Manufacture of non-electrical instruments and appliances for measuring, checking, testing, navigating and other purposes
33.3	Manufacture of industrial process control equipment
33.4	*Manufacture of optical instruments, photographic equipment*
33.401	*Manufacture of spectacles*
33.402	*Manufacture of optical instruments, photographic equipment*
33.5	*Manufacture of watches and clocks*
64	**Post and telecommunications**
64.1	*Post and courier activities*
64.110	*National post activities*
64.120	*Courier activities other than national post activities*
64.2	Telecommunications
72	**Computer and related activities**
72.1	Hardware consultancy
72.2	Software consultancy and supply
72.3	Data processing
72.4	Data base activities
72.5	Maintenance and repair of office, accounting and computing machinery
72.6	Other computer related activities

Note: NACE two digit level in bold text, ICT sectors in plain text, non-ICT but included in ICT based on two digit NACE codes in italic text.
Source: Camire, Steunpunt WAV, 2003

Since the Datawarehouse has data at a five digit level of NACE, we are able to make a distinction between a two digit ICT definition and a three digit ICT definition based on the starting classification in Table 2.2. When speaking of the two digit ICT sector we take all subsectors in Table 2.3 into consideration, while when analysing the three digit ICT sector the subsectors in italics (33.1, 33.4, 33.5 and 64.1) are excluded.

In order to enable comparisons with other activity sectors, we make the following distribution on the basis of the three digit NACE coding (adapted from Åkerblom & Virtaharju, 2001):

Table 2.4 Classification of activity sectors based on NACE-Belcode*

STILE sector	Description	NACE code
	ICT	
1.1	Office accounting and computing machinery and electronic equipment	30, 32, 33.2, 33.3
1.2	Telecommunications	64.2
1.3	Computer and related activities	72
	Agriculture, mining, manufacturing, utilities, construction	
2.1	Agriculture, forestry, fishing	01, 02, 05
2.2	Mining, quarrying	10, 11, 12, 13, 14
2.3	Consumer goods	15, 16, 17, 18, 19
2.4	Wood, pulp and paper, printing, oil refining, chemical industry, rubber, plastics	20, 21, 22, 23, 24, 25
2.5	Metals, machinery (not ICT)	27, 28, 29, 31, 33.1, 33.4, 33.5, 34, 35
2.6	Other manufacturing	26, 36, 37
2.7	Energy and water	40, 41
2.8	Construction	45
	Trade, hotels, restaurants, transport, communication, financial intermediation, other services (excl. ICT, educational and research institutes)	
3.1	Wholesale and retail trade, hotels, restaurants	50, 51, 52, 55
3.2	Transport, storage, post, communications	60, 61, 62, 63, 64.1
3.3	Financial intermediation	65, 66, 67
3.4	Other services	70, 71, 74
	Educational and research institutes	
4.1	Universities, educational institutions	80
4.2	Research institutes	73
	Other community services	
5.1	Health activities	85
5.2	Other community services	75 to 95 excl. 80 and 85
5.3	Extraterritorial organisations	99

* NACE-Belcode is the official national Belgian version of the NACE classification. The data contained by Datawarehouse on employers is centralised, which means there is no specific information for the local establishment the employee works at, but that the employer is used as a general reference point. If an employer has several establishments and various activities, the geographic location of the head office and/or main activity are given.

Source: Camire, Steunpunt WAV, 2004

2.3 Idealism versus reality: what are the different ways of calculating mobility?

At the heart of mobility is change. Change between two different states and at two different points in time. In order to be able to calculate mobility, therefore, you need a source that is able to provide you with information on these different situations. So, what kind of mobility is it that we want to measure? This section will outline the various different ways of calculating the mobility in which this report is interested, what they measure and, crucially, what they miss.

Due to differences in the coding used in the LFS and DWH the remainder of this section is divided according to these two sources. It is worth underlining that these differences do not extend to conceptual differences in the way mobility is calculated.

2.3.1 Using the EU LFS

Unless a derived proxy-measurement is calculated (i.e. changes in the number of people in the ICT sector from one year to the next as a net inflow/outflow), then it is essential to have data for two different points in time. One way of doing this is to make two extractions of data and compare for the same group of sampled individuals key information such as working status or sector of activity. The disadvantage of this method is that if a measurement of mobility between one year and the next is desired, then because respondents only participate in the survey for a limited period of time, the number of people for which data is available at both points will be small and not necessarily representative of the economy as a whole.

Another way of calculating mobility is by using information from the retrospective questions that are included in the European Union Labour Force Survey questionnaire. The wording of these questions is such that the information can be easily compared with the current year. In combining the indicators with other information relevant to the *e*Economy, a number of different labour market developments can be measured. One is the total number of inflows into ICT sectors, providing an indication of the attractiveness of these sectors. As well as previously employed people, this includes inflows of people that in the previous year were either unemployed or inactive (i.e. a student). Another, more focused measurement, looks at job-to-job mobility i.e. of someone that changes employer between one year and the next. Using responses on when the person started working for this employer or as self-employed can control for mobility between two same states.

The problem with retrospective questioning is that it relies on respondents correctly remembering a situation that was twelve months before. The ability of respondents to do so will depend partly on the type and level of detail of the question. Retrospective questioning may also pose a particular problem in the case of proxy-responses, that is, if someone is answering on behalf of someone else in the household. A more detailed discussion on retrospective questioning follows in Chapter 9.

Measuring labour status mobility - inflows and outflows

A person's labour status refers to their situation vis-à-vis employment. In other words, are they employed, unemployed or inactive? Making use of the retrospective questioning in the EU Labour Force Survey, there are two main ways of calculating labour status mobility: using the variable main status (Mainstat) or the variable working status (WSTATUT).

There are a few main differences between the variables WSTATUT and Mainstat. WSTATUT refers specifically to a reference week and uses responses from other questions to determine whether people fall into the ILO definitions of employed, unemployed or inactive. Mainstat, on the other hand, simply relies on the individual's subjective opinion on their main status over a reference period of three months prior to and including the reference week of the survey. It is only natural therefore to expect some differences to exist when comparing the two. In order to respect an internationally harmonised and recognised definition of employment, this report uses the variable WSTATUT.

The variable used to calculate the change in this case is Mainstat1y, referring to the individual's working status one year prior to the survey reference period. A measure of mobility relies on a changing status of the individual. With the responses to these questions, it is theoretically possible to measure such flows as labour market inflows (unemployment or inactive status such as student ⇒ employment), or labour market outflows (employment ⇒ unemployment or retirement).

The algorithm for calculating labour market inflows would be the following:[6]

$$\frac{\text{WSTATUT} = 1, \text{Mainstat1Y} = 2 \text{ to } 8}{\text{WSTATUT} = 1, \text{Mainstat1Y} = 1 \text{ to } 8} \times 100$$

Measuring job-to-job mobility

As well as the variables WSTATUT and Mainstat1Y explained in the previous section, when measuring job-to-job mobility, a variable is necessary that distinguishes individuals employed in both years, but with the same employer, from those who have changed between two different situations of employment. The variable referring to the time at which the person started working for this employer or as self-employed is called TOW.

The variable TOW was calculated at Eurostat as requested for this data extraction and, in effect, separates individuals into groups according to the time they have been with their current employer or as self-employed. The groups are TOW1: <12 months; TOW2: 12-23 months; TOW3: 24 months and over.

If someone is reported in the first category, they have been working with their current employer or as a self-employed person for under one year, thereby providing information on the change necessary to distinguish them from individuals that have remained in the same job. The algorithm for calculating job-to-job mobility, where again it is important to exclude non-reporting, would be the following:[7]

$$\frac{\text{WSTATUT} = 1, \text{Mainstat1Y} = 1, \text{TOW1}}{\text{WSTATUT} = 1, \text{Mainstat1Y} = 1, \text{TOW1 to 3}} \times 100$$

One problem with this measurement is that the data does not provide any information on the length of time that the person who has changed jobs spent in their former oc-

6 Note that 1 = employed and 2 to 8 is not employed. Full descriptions of these codes can in any case be found in the methodological notes in Annex 2. Note also that it is important to exclude not applicable and non-response answers from the both the numerator and the denominator so as to include only those people who have been able to report on their situation one year before. Non-response could just as easily apply to inactives as to employed or unemployed individuals.

7 WSTATUT = 1: employed, Mainstat1y = 1: employed. For detailed information see Annex 2.

cupation. It will therefore be difficult to gain much understanding as to what degree knowledge diffusion in ICT will have occurred as a result of a change in employer (see section 2.4).

Another limitation is that it refers to the status at the time of the two reference periods in years t and t-1 and so therefore does not identify other occurrences: a long period of unemployment between jobs or numerous changes of employment within the same year.

Measuring sectoral mobility - inflows, outflows and intrasectoral flows

There are two ways of measuring sectoral mobility using the EU LFS, one providing more focus than the other. The simplest, but least focused, uses information on NACE sector of activity in both the current and the previous year to inform on whether there have been structural shifts into or out of the ICT sector. The following algorithm can be used to calculate the number of inflows to the ICT sector (where t = time [year]).

$$NACE_{t} = ICT, NACE_{t-1} \neq ICT$$

The problem with this method is that workers are often mobile within the same sector. That is to say when individuals change job, often they will merely change employer, and will carry out a similar occupation within the same sector. As a result, though suitable for measuring inflows and outflows, only using information on the NACE sector of activity will not be sufficient for capturing an accurate level of mobility *within* the ICT sector. To capture mobility within the ICT sector, for example, another method is necessary. This supplements information on NACE with that from the variable TOW. Furthermore, non-ICT sectors can theoretically be split/aggregated into groups of sending sectors. Indicators can be developed to show the proportion of all inflows that have gone into the ICT sector or the proportion of all ICT that are inflows.

Net flows - using changes over time as a proxy for overall mobility

The final method of measuring change in the *e*Economy is the simplest. This takes the difference between, for example, the number of female ICT workers at two different points in time as a proxy-measurement for mobility inflows or outflows. It should be underlined that this is a net measurement, that is the number of inflows minus the number of outflows, and so will underestimate the overall level of mobility. Essentially, it is growth, but, with a longer time series, it will nevertheless give a good impression of the changing composition of the *e*Economy and its workers.

2.3.2 Using the Datawarehouse

As each individual's socio-economic position and/or employer is known for the end of each quarter in the Datawarehouse, there are various possibilities to analyse mobility. Changes in position or in employer in between two moments can be studied; so quarterly as well as yearly comparisons are possible. This can be done by looking ahead in time (outflow: shift between t and t+1) as well as back in time (inflow: shift between t-1 and t). But just as a comparison of positions at two points in time is possible, so too can career paths (individual and collective) be constructed. It is perfectly possible, for example, to follow-up a particular cohort's future career path, or to look

at the employment history of a certain cohort. The mobility which we thus measure can be crossed with various other variables, such as the type of employment (full-time/part-time), or the employer's NACE code.

Measuring labour status mobility - inflows and outflows

Labour status mobility refers to a *change in socio-economic position/labour status* (employed, unemployed, inactive; with further possible subdivisions (see Table 2.1)), but also a change in employment regime (full-time, part-time) could be looked upon as labour status mobility.

Measuring job-to-job mobility

Job-to-job mobility is commonly conceived as a change of employer. In the Datawarehouse only data about the individual's legal employer (enterprise) is included and not about the establishment. We measure mobility as a change of the relation between an individual's unique ID-number and his/her employer's unique ID-number. A shortcoming of this method is that we miss the job-to-job mobility within one enterprise: a clerk becoming head of his department is not regarded as job-to-job mobile. Nor is a change of establishment within the enterprise regarded as job-to-job mobility.

When analysing job-to-job mobility we come to another specific problem. An important cause of mobility is entry and exit of enterprises: a significant share of mobility is the result of enterprises going out of business or being restructured in such a way that they change their identification number in the registers upon which the definition of mobility is based (Nås et al., 2001). The identification number of enterprises can change due to administrative and economic reasons (i.e. take-over, split-off, etc.) resulting in 'false' mobility.

To a certain degree, this 'false' mobility is corrected for in the Datawarehouse. We developed an algorithm in order to make a distinction between 'individual' (I), 'collective' (C) and 'no' (Q) mobility and people in a special (S) employment regime. This algorithm has been applied to all wage earners who then receive a mobility code I, C, Q. Only people with a 'special' regime were excluded and receive no mobility code (S).[8] The idea is that if a certain transition from employer X to employer Y between two quarters is being made by twenty employees or more, this change of employer identification number is considered to be a statistical artefact. The employee making this transition gets a code 'C' and is not considered to have been mobile.

Measuring sectoral mobility - inflows, outflows and intrasectoral flows

If we select all persons with code 'I' and put them in a mobility matrix with on the axes the NACE codes of the two considered quarters we can quantify the mobility between sectors.

8 There are four types of regime: full-time, part-time, special and undefined. The special regime refers to seasonal work and temporary work (literally 'at short intervals'). These workers are believed to be mobile by definition and they would distort the mobility rates of the total population.

2.4 Measuring knowledge

If we wish to gain a better insight into the diffusion of Information Society Knowledge, we must be able to define the transfer of an employee as the transfer of knowledge and skills. This knowledge and skills contain various components, including formal education, work experience, but also personality traits like awareness, creativity, analytical thinking or understanding. To that extent, the dissemination of Information Society Knowledge should at its widest level incorporate anyone that has been working in the Information Society, who can be assumed to carry knowledge about the sector. As a result, the broadest approach to the dissemination of Information Society Knowledge in this report will include all workers in the ICT sector, though people with a tertiary education remain an interesting area upon which to focus in more detail.

This is how knowledge and skills are most commonly measured: using data on formal education, where formal education corresponds to the years, level and type of schooling received. Though there are many other forms of knowledge that individuals acquire as a result of their personal and professional development, these are much more difficult to measure in a way that will provide meaningful and internationally comparable indicators. Formal education, on the other hand, can be measured and translated to the International Standard Classification of Education. In the context of this workpackage, the level of education provided using Labour Force Survey data will follow this international standard.

The current problem in Belgium is measuring this knowledge and skills through administrative databases. For instance, the Datawarehouse contains no information about the educational attainment or additional training courses followed, nor about the respective positional level or the years of service of the employee in the company. The DWH analysis therefore carries the assumption outlined above, that every person carries relevant general knowledge with them and every transition therefore results in some knowledge flow.

Chapter
3

ICT employment and growth

The previous chapter outlined the methodological considerations for the measurement of mobility in the ICT sector using the EU LFS and the DWH. Having done so, this chapter provides an overview of not just the current level and growth of employment in the ICT sector in the various European countries, but also greater detail on the socio-economic characteristics of ICT workers. In so doing, it compares developments in the ICT sector to the overall economy in order to benchmark to what extent the ICT sector is outperforming or even behind the economy in general.

3.1 The Belgian perspective

On the basis of the Datawarehouse, it is possible to demarcate the ICT sector at the three digit level of the NACE-Belcode. Below, we will describe the ICT sector in the light of a number of characteristics of employees working in NACE sectors 30, 32, 33.2, 33.3, 64.2 and 72.

3.1.1 Employees in the ICT sector and the evolution

The ICT sector in Belgium employs approximately 89,300 people between 15 and 64 years old (Table 3.1). This is almost 2.8% of the total number of employees. *Telecommunications* account for a third of those (34.5%, NACE 64.2). Other large subsectors are *software consultancy and supply* (19.7%, NACE 72.2) and *hardware consultancy* (14.8%, NACE 72.1). These three sectors therefore have a large bearing on the characteristics of the total ICT sector. Next in size are the subsectors *manufacturing of radio, television and communication equipment and apparatus* (NACE 32; together they account for 21.5%).

Demarcating the ICT sector on the basis of two digits, we find around 142,500 employees (4.4% of total employees). The main advantage of using the three digit level is that, within NACE 33, it is possible to distinguish between, on the one hand 33.2 and 33.3 as ICT, and on the other hand 33.1, 33.4 and 33.5 as non-ICT. Similarly one can distinguish within NACE 64 between 64.2 as ICT and 64.1 as non-ICT. With data available at the three digit level we can exclude 33.1, 33.4, 33.5 and 64.1, which will give us a more accurate classification of the ICT sector. Doing this the total number of employees in ICT in Belgium drops from 142,500 people to 89,300 people. The main cause is NACE 64.1 (postal sector) with almost 50,000 employees.

Table 3.1 Distribution of employees aged 15-64 in ICT by subsector - Belgium, average quarter 2000

NACE/sector	Description	N	%
30	**Manufacture of office machinery and computers**	**456**	**0.5**
30.0	Manufacture of office machinery and computers	456	0.5
30.010	Manufacture of office machinery	32	0.0
30.020	Manufacture of computers and other information processing	424	0.5
32	**Manufacture of radio, television and communication equipment and apparatus**	**19,248**	**21.5**
32.1	Manufacture of electronic valves and tubes and other electronic components	5,077	5.7
32.2	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy	7,953	8.9
32.201	Manufacture of TV and radio transmitters	465	0.5
32.202	Manufacture of apparatus for line telephony and line telegraphy	7,488	8.4
32.3	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods	6,217	7.0
33	**Manufacture of medical, precision and optical instruments, watches and clocks**	**2,626**	**2.9**
33.1	*Manufacture of medical and surgical equipment and orthopaedic appliances*	*2,836*	:
33.101	*Manufacture of electrical apparatus for medicine, dentistry and veterinary medicine*	*288*	:
33.102	*Manufacture of non-electrical apparatus and instruments for medicine, dentistry and veterinary medicine*	*722*	:
33.103	*Manufacture of orthopaedic appliances*	*1,827*	:
33.2	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment	1,524	1.7
33.201	Manufacture of electrical instruments and appliances for measuring, checking, testing, navigating and other purposes	610	0.7
33.202	Manufacture of non-electrical instruments and appliances for measuring, checking, testing, navigating and other purposes	914	1.0
33.3	Manufacture of industrial process control equipment	1,103	1.2
33.4	*Manufacture of optical instruments, photographic equipment*	*623*	:
33.401	*Manufacture of spectacles*	*349*	:
33.402	*Manufacture of optical instruments, photographic equipment*	*274*	:
33.5	*Manufacture of watches and clocks*	*340*	:
64	**Post and telecommunications**	**30,811**	**34.5**
64.1	*Post and courier activities*	*49,368*	:
64.110	*National post activities*	*44,320*	:
64.120	*Courier activities other than national post activities*	*5,048*	:
64.2	Telecommunications	30,811	34.5
72	**Computer and related activities**	**36,205**	**40.5**
72.1	Hardware consultancy	13,229	14.8
72.2	Software consultancy and supply	17,607	19.7
72.3	Data processing	2,196	2.5
72.4	Data base activities	1,102	1.2
72.5	Maintenance and repair of office, accounting and computing machinery	1,877	2.1
72.6	Other computer related activities	193	0.2

Table 3.1 Distribution of employees aged 15-64 in ICT by subsector - Belgium, average quarter 2000. Continued

NACE/sector	Description	N	%
ICT	*2 digits*	*142,512*	*:*
ICT	**3 digits**	**89,345**	**100.0**
STILE 1.1	Office accounting and computing machinery (NACE 30, 32, 33.2 and 33.3)	22,330	25.0
STILE 1.2	Telecommunications (NACE 64.2)	30,811	34.5
STILE 1.3	Computer and related activities (NACE 72)	36,205	40.5
Total economy		3,235,914	

Note: % share is calculated as a proportion of ICT at the three digit level (89,345 employees).
Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

3.1.2 Recent growth in the ICT sector

The Datawarehouse does not enable us to outline any long-term evolution. But on the basis of the RSZ (National Institute for the Social Insurance of the Employed) data we can nevertheless estimate the evolution of the number of jobs (not the number of employees, but the number of jobs) in the ICT sector demarcated on the basis of three digit NACE codes. In each case, the data relates to the last day of the second quarter. We must be careful with these figures because administrative shifts (for instance due to changes in NACE codes, fusions and take-overs) were not corrected. The figures only allow us to highlight global trends.

Table 3.2 Evolution of the number of jobs in ICT and the proportion of ICT in the total number of jobs in the Belgian economy - Belgium, 30 June 1997-2002

STILE sector	NACE sector	1997 (n)	2002 (n)	1997-2002 (n)	1997 (%)	2002 (%)
1.1	30, 32, 332, 333	22,800	21,100	-1,700	0.7	0.6
1.2	642	30,100	33,500	+3,300	0.9	1.0
1.3	72	22,100	41,600	+19,500	0.7	1.2
ICT 3 digits		75,000	96,100	+21,100	2.3	2.8

Source: RSZ (Processed by Steunpunt WAV)

Both the *industrial branch of ICT* (STILE 1.1) and *Telecommunications* (STILE 1.2) have noticeably undergone a rather stable development since 1997. Meanwhile *Computer and related activities* (STILE 1.3) have seen a significant increase in the number of jobs. The number of jobs in this sector almost doubled between 1997 and 2002. As a consequence, the proportion of the ICT sector in the entire economy has also increased. It is worth noting that the number of jobs in all sectors, including ICT, declined between 2001 and 2002 (not in Table 3.2). The ICT sector does not vary greatly in this respect from most other commercial and industrial sectors.

The number of self-employed people working in the ICT sector cannot be determined by means of the Datawarehouse or the register data of the RSVZ (National Institute for the Social Insurance of the self-employed) because of the latter's occupational coding system. The coding system is not based on the NACE-Belcode classifi-

cation but rather follows the specific logic of the RSVZ, which forms an authentic source of information on the self-employed. It is impossible to demarcate the ICT sector on the basis of these occupational codes.

Nevertheless, to get some idea of the number of self-employed people in ICT, we can carry out an estimate on the basis of the proportion of self-employed people/employees in ICT (within two digits of the NACE-Belcode) according to the Belgian LFS. On applying this proportion to the number of employees in the ICT sector according to the Datawarehouse, we estimate that approximately 10,000 self-employed (including helpers) work in ICT (two digits), approximately 6,200 of which are working in *Computer and related activities.*

3.1.3 Educational attainment in the ICT sector

On the basis of the Datawarehouse, we cannot come to any conclusions regarding the educational attainment of employees in the ICT sector. The LFS, on the other hand, enables us to do so, as long as the ICT sector is defined on the basis of two digits of the NACE-Belcode.

Table 3.3 Distribution of employees aged 15-64 in ICT by educational attainment - Belgium, 2002

STILE sector	NACE sector	Total (n)	Up to lower secondary education (%)	Higher secondary education (%)	Tertiary education (%)
1.1	30, 32, 33	33,800	18.1	33.5	48.4
1.2	64	82,100	35.4	38.3	26.3
1.3	72	50,400	:	21.2	75.0
ICT 2 digits		*166,300*	*22.3*	*32.1*	*45.5*
Total economy		3,352,000	27.9	37.6	34.4

Source: NIS LFS (Processing Steunpunt WAV)

Approximately 34% of employees in Belgium in 2002 are highly qualified, while 28% of them are educated at the lower secondary level.[9] In the ICT sector, the proportion of highly qualified employees is significantly higher. Almost 46% of employees in the ICT sector are highly qualified. Within the ICT sector, important differences are evident. It is not very surprising that NACE sector 72 (*Computer and related activities*, including *consultancy*) contains the largest proportion of highly qualified employees. No less than three out of four employees in that sector are highly qualified. This contrasts sharply with NACE sector 64 (*Postal services* and *Telecommunications*) in which only one out of four employees is highly qualified. Presumably, the postal services particularly reduce the proportion of highly qualified, since only a small ratio of the employees aged between 45 and 64 are highly qualified and since we also know that not many people aged 45 or over work in telecommunications. The *Manufacturing ICT* (STILE 1.1) sector with 48% also contains an above average proportion of highly qualified employees.

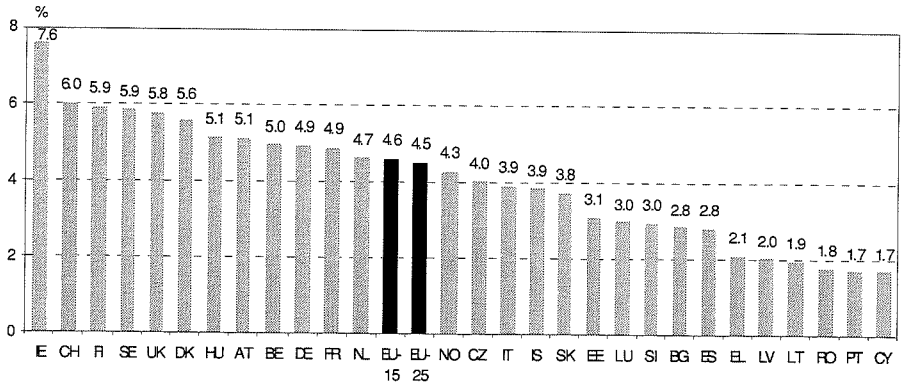
9 'Highly qualified' includes people who completed third level education ISCED 5 or 6. 'Lower secondary education' includes people with incomplete education or education ISCED 0 to 2.

3.2 The European perspective

3.2.1 ICT employment-intensity and recent growth

Figure 3.1 shows the degree of ICT employment-intensity in each European country in 2002.[10]

Figure 3.1 ICT employment-intensity - European countries, 2002



EU-25 and EU-15 are estimated.
Exceptions to the reference year 2002: DE, LU = 2001.
Source: EU LFS, spring data

ICT employment-intensity is simply the proportion of total jobs in the ICT sector in each economy. Ireland has by far the highest proportion at 7.6%. Other leading countries in terms of ICT employment-intensity are Switzerland, Finland, Sweden, the UK and Denmark, all with over 5.5% of total employment in the ICT sector. In 2002, Portugal and Cyprus had the lowest level of ICT employment-intensity at 1.7% each, just over a third of the average for the EU-25. With Poland excluded from the calculation of EU-25, the EU-15 average at 4.6% is not much higher than the EU-25 average, despite most of the new Member States having a lower proportion of their employed working in the ICT sector. This is because the relative weight of their economies does little to affect the EU-15 aggregate.

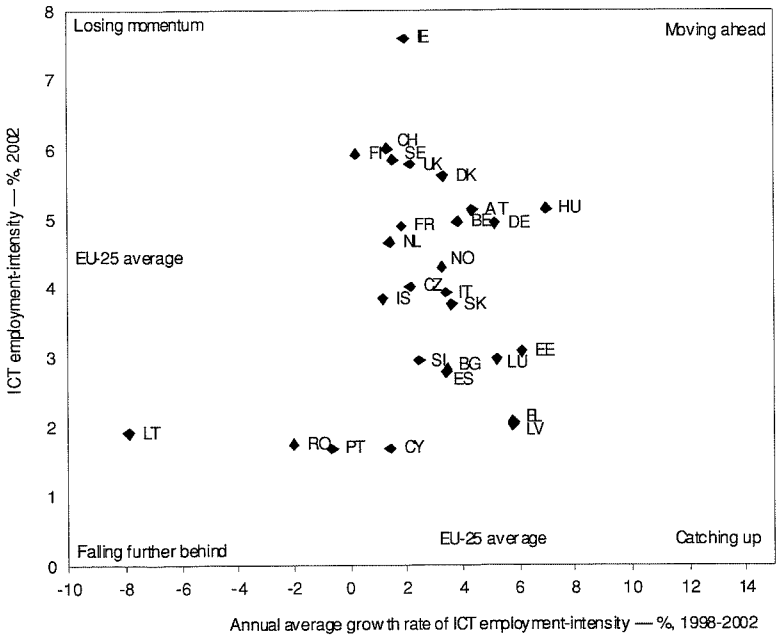
Figure 3.2, which measures ICT employment-intensity in 2002 along with its annual average growth between 1998 and 2002, helps to analyse this intensity in the context of recent performance.[11] Countries to the right of the vertical dotted line had an ICT employment-intensity that was increasing at a rate exceeding the EU-25 average (2.7%), while countries above the horizontal dotted line had an ICT employment-

10 It should be borne in mind that the population on which the analysis for the European perspective is based consists of 25-64 year olds and, when broken down, the main age groups 25-34, 35-44, and 45-64. This gives some emphasis to the younger cohorts of ICT workers and, hence, allows additional focus on inflows into the ICT sector, the majority of whom are aged 25-44. To avoid frequent repetition, in both the text and the titles to the graphs, the population of employed 25-64 year olds for the European perspective is often referred to as total employment.

11 Lower data availability before 1998 for the new Member States reflects the choice of 1998 as the base reference year. Longer time series exist for some countries (especially the EU-15) and these can be seen for certain indicators in the country reports in Annex 1.

intensity above the EU average in 2002 (4.2%). This grid thus splits countries into four distinct categories: moving ahead, losing momentum, catching up and falling further behind. The countries with lower than average ICT employment-intensity but that are nevertheless catching up are Italy, Slovakia, Bulgaria, Spain, Luxembourg, Estonia, Greece and Latvia. There, annual average growth in ICT employment-intensity ranged between 3.4% and 6.1% between 1998 and 2002. Of the new Member States, Hungary has been moving ahead at the highest rate. Indeed, growth of ICT employment-intensity in Hungary has been the highest of any country analysed (7%).

Figure 3.2 Country trends in intensity and growth of ICT employment-intensity - European countries, 2002, AAGR 1998-2002



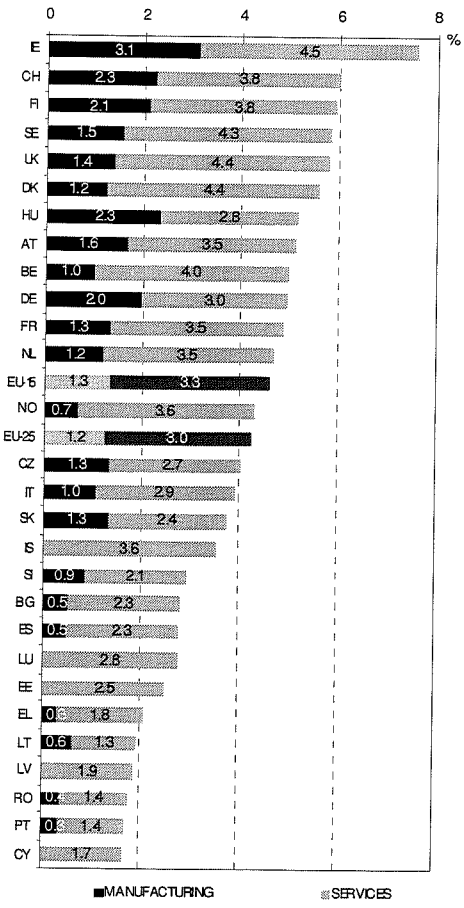
EU-25 average is estimated.
Exceptions to the reference year 2002: DE, LU = 2001.
Exceptions to the reference period 1998-2002: DE, LU = 1998-2001; EU-25, CY = 1999-2002; BG = 2000-2002.
Source: EU LFS, spring data

In Ireland, data points to the existence of a substantial level of ICT jobs prior to 1998 since growth in the number of jobs in the ICT sector relative to the total has been losing momentum compared to the European average between 1998 and 2002. At 1.9%, growth is nevertheless just lower than the EU-25 average. In Finland, however, the proportion of ICT among total jobs has changed little between 1998 and 2002. With employment continuing to rise in Finland over this period, this means that the ICT sector has expanded at a rate equivalent to the economy overall (around 1.8% employment growth per year, which is why the annual average growth of ICT employment-intensity is around 0% in Figure 3.2).

3.2.2 Manufacturing and services in the ICT sector

Just as in the European economies generally, ICT employment is geared towards the service sector to a greater extent than manufacturing (Figure 3.3). Nowhere is this more prevalent than in Greece, where of all ICT employment in 2002, 86% was in ICT services, though Norway, Spain, Bulgaria and Belgium all have 80% or above of ICT employment in services. At the other end of the scale, Hungary (45%), Ireland (41%) and Germany (40%) have the highest ratios of ICT sector employment in manufacturing. This is equivalent to 2.3%, 3.1% and 2% of total employment, respectively.

Figure 3.3 ICT employment in manufacturing and services as a % of total employment; ICT employment in services as a % of total ICT employment; employment in services as a % of manufacturing and services - European countries, 1998 and 2002



	% ICT services, 1998	% ICT services, 2002	% services in manufacturing and services, 2002
IE	53.8	58.9	83.0
CH	57.2	62.5	82.6
FI	70.3	64.4	78.8
SE	66.4	73.6	82.6
UK	66.5	76.1	83.4
DK	79.4	78.2	83.5
HU	58.8	54.6	74.6
AT	57.1	67.9	79.3
BE	77.8	80.1	82.0
DE	56.9	60.1	74.9
FR	67.9	72.5	82.5
NL	68.4	74.0	85.4
EU-15	66.2	71.2	79.7
NO	83.3	84.3	87.3
EU-25	68.3	70.8	79.1
CZ	71.1	67.3	68.8
IT	71.9	73.4	75.9
SK	74.4	64.7	70.5
IS	:	:	90.0
SI	64.2	71.2	64.4
BG	77.5	82.4	74.0
ES	75.5	83.4	80.3
LU	:	:	88.5
EE	:	:	77.2
EL	88.1	86.0	85.3
LT	75.9	68.3	79.8
LV	:	:	82.6
RO	80.2	79.1	63.1
PT	77.0	79.7	74.7
CY	:	:	88.4

EU-25 and EU-15 are estimated. EU-25 excludes Poland.
Exceptions to the reference year 2002: DE, LU = 2001.
Data for manufacturing ICT employment in CY, LU, LV and IS is unreliable.
Source: EU LFS, spring data

That said, ICT employment is nevertheless more manufacturing-oriented than is the case when employment is not differentiated for ICT. At the European level in 2002, services accounted for close to 80% of total service and manufacturing jobs, whereas in ICT this same ratio stood at around 70%. As a proportion of all manufacturing and services employment (agriculture and utilities being excluded), most countries are more manufacturing-oriented in ICT than they are overall. The exceptions to this trend are Greece, Spain, Portugal, Slovenia, Bulgaria and Romania. In Greece and Spain, however, the differences are low.

There has also been an increasing level of service-orientation to ICT sector employment between 1998 and 2002. This is true for 15 of the 23 countries for which data is available. Austria and the UK have experienced the most rapid shifts towards a greater proportion of ICT employment in services. In Austria, 57% of employment in the ICT sector was in services in 1998, but by 2002, this had increased by over 10 percentage points to around 68%. In the UK, the same period saw the proportion of ICT workers in the service sector increase from 66.5% to around 76%. This shift in the composition of the ICT sectors in Austria and UK is due partly to a receding ICT manufacturing sector (net outflow of jobs) but mainly to significant growth, or net inflow of jobs, in the ICT service sector (not in figure).

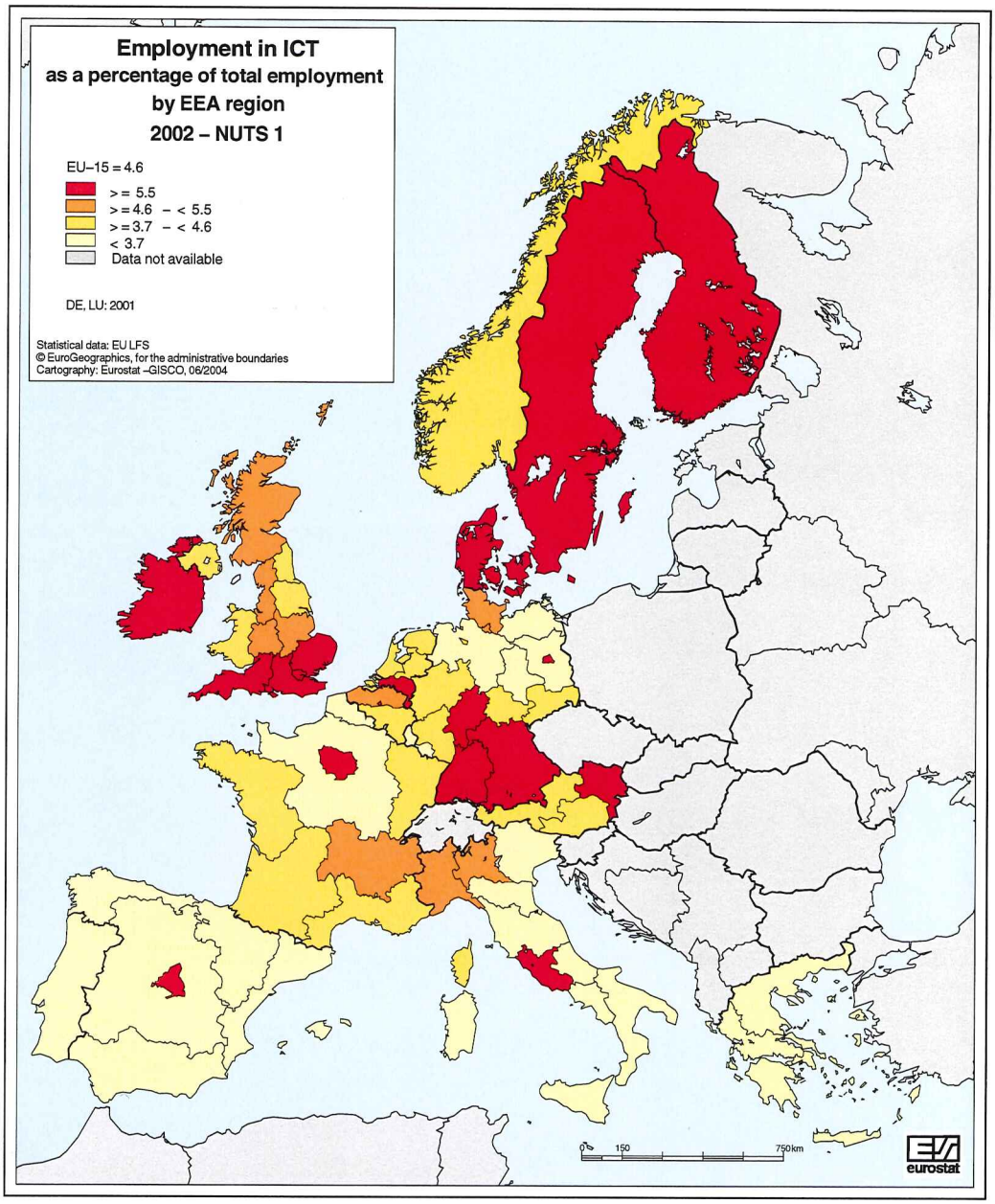
3.2.3 ICT in the regions

If the comparison between EU Member States at the national level provides a picture of a highly differentiated emphasis upon ICT employment, then this is even more the case at the regional level. But ensuring an equitable development between the various European regions is enshrined in article 158 of the Treaty of Amsterdam, which reads: '... the Community shall aim at reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions or islands, including rural areas'.[12]

As is shown in Table 3.4, the region of Berkshire, Buckinghamshire and Oxfordshire in the UK has the highest ICT employment-intensity in the EU-15, Iceland and Norway, where more than one in every ten jobs is in the ICT sector. In fact, the UK has eight regions among the leading 30 in the EU-15, with ICT employment-intensities otherwise ranging between second UK placed Bedfordshire, Hertfordshire at 9.2% and East Anglia (6.4%). The Swedish region of Stockholm is placed second overall, with close to one in every 10 jobs in 2002 in the ICT sector. Otherwise, in the top 10 there was one Austrian region (Wien, 9%), one Finnish (Uusimaa, 8.9%), one French (Ile de France, 8.4%), the Irish Southern and Eastern (8%), the German Darmstadt (7.9%) and Oslo og Akershus in Norway (7.9%).

Even though Berkshire, Buckinghamshire and Oxfordshire has the highest ICT employment-intensity in Europe, ICT jobs still only account for just over 7% of all ICT sector jobs in the UK. In fact, the ICT sector seems to be fairly regionally disparate in the UK, with the highest concentration of jobs evident in Outer London, which accounts for 10.5% of all ICT sector jobs. Other, mainly smaller, countries show higher concentrations of ICT sector employment. In Ireland, where 80% of ICT sector jobs are in the Southern and Eastern region, this is due to the fact that there are only two NUTS 2 regions - 76% of total Irish jobs were in this same region (not in table) so the concentration of ICT sector jobs is little different from the total. But other countries show a strong regional concentration around the capital cities: Stockholm (SE), for example, accounts for 37% of all ICT sector jobs and, even higher, Oslo (NO) and

12 http://Europa.Eu.Int/Comm/Regional_Policy/Intro/Regions3_En.Htm.


Employment in ICT
as a percentage of total employment
by EEA region
2002 – NUTS 1
EU–15 = 4.6
>= 5.5
>= 4.6 – < 5.5
>= 3.7 – < 4.6
< 3.7
Data not available
DE, LU: 2001
Statistical data: EU LFS
© EuroGeographics, for the administrative boundaries
Cartography: Eurostat –GISCO, 06/2004
0
150
750km
eurostat

Uusimaa (FI) account for 43.5% and around 47% of national ICT employment, respectively.

This is also depicted in the map attached to this report, which shows the level of ICT employment-intensity at the NUTS 1 level (NUTS 1 level is equal to country level in some countries i.e. Denmark). Germany and the UK, especially, have a number of regions that have a higher than average level of ICT employment-intensity. In other countries such as Spain or Italy, ICT employment seems to be regionally concentrated around the capital cities (though in Italy, Lombardia also displays an above average ICT employment-intensity).

Table 3.4 Top 30 ICT employment-intensive regions - EU-15, Iceland and Norway, 2002

Ranking	Country	Region NUTS 2 level	ICT employment 1,000s	Total employment 1,000s	ICT as a % of total employment %	% share of total national ICT employment
	EU-15		6,592	142,802	4.6	
1	UK	Berkshire, Bucks and Oxfordshire	102	981	10.4	7.4
2	SE	Stockholm	83	857	9.7	37.3
3	UK	Bedfordshire, Hertfordshire	65	709	9.2	4.7
4	UK	Hampshire and Isle of Wight	71	781	9.1	5.1
5	AT	Wien	60	668	9.0	36.3
6	FI	Uusimaa (Suuralue)	58	655	8.9	46.8
7	FR	Ile de France	384	4,582	8.4	36.4
8	IE	Southern and Eastern	86	1,072	8.0	80.0
9	DE	Darmstadt	126	1,588	7.9	8.0
10	NO	Oslo og Akershus	37	466	7.9	43.5
11	UK	Outer London	145	1,879	7.7	10.5
12	UK	Surrey, East and West Sussex	84	1,098	7.7	6.1
13	DE	Karlsruhe	82	1,082	7.5	5.2
14	FI	Pohjois-Suomi	15	201	7.5	12.0
15	ES	Comunidad de Madrid	155	2,080	7.5	38.6
16	DE	Oberbayern	133	1,801	7.4	8.4
17	DE	Mittelfranken	49	698	7.0	3.1
18	DE	Freiburg	60	855	7.0	3.8
19	UK	Gloucestershire, Wiltshire and North Somerset	66	944	7.0	4.8
20	BE	Vlaams Brabant	28	409	6.9	15.4
21	DE	Stuttgart	111	1,653	6.7	7.0
22	FR	Franche-Comté	30	456	6.6	2.8
23	UK	Cheshire	26	403	6.5	1.9
24	BE	Région Bruxelles-capitale/ Brussels hoofdstad gewest	20	309	6.5	10.9
25	UK	East Anglia	61	941	6.4	4.4
26	BE	Antwerpen	39	606	6.4	21.2
27	NL	Utrecht	31	493	6.3	9.9
28	IE	Border, Midlands and Western	21	342	6.3	20.0
29	IT	Lazio	119	1,893	6.3	15.3
30	NL	Flevoland	9	143	6.1u	2.7u

u = data should be treated with caution.
Source: EU LFS, spring data

3.2.4 ICT and educational attainment

Foray and Lundvall argue that 'even if we should not take the ICT revolution as synonymous with the advent of the knowledge-based economy, both phenomena are strongly interrelated ... the ICT system gives the knowledge-based economy a new and different technological base which radically changes the conditions for the production and distribution of knowledge as well as its coupling to the production system' (Foray & Lundvall, 1996, p. 14).

Table 3.5 Knowledge intensity (% of people with 3rd level education) of the employed in the ICT sector and overall - European countries, 1998 and 2002

	1998				2002			
	Total employment		ICT employment		Total employment		ICT employment	
	1,000s	% tertiary	1,000s	% tertiary	1,000s	% tertiary	1,000s	% tertiary
EU-25	146,623	23.3	5,989	30.5	156,054	25.3	7,095	35.4
EU-15	133,803	24.6	5,568	31.3	142,802	26.6	6,592	36.1
BE	3,515	33.1	150	38.0	3,676	35.0	182	44.9
CZ	4,093	12.4	151	15.8	4,242	14.0	171	21.4
DK	2,225	28.7	109	29.1	2,333	30.3	131	32.8
DE	31,684	27.5	1,387	33.1	32,013	27.9	1,578	34.5
EE	529	34.1	13	44.1u	512	33.1	16	58.7u
EL	3,456	21.6	57	28.5	3,500	22.4	73	35.7
ES	12,033	26.4	294	48.2	14,346	30.5	401	56.2
FR	20,367	24.1	926	31.3	21,589	27.7	1,055	40.7
IE	1,318	27.2	94	40.7	1,373	28.9	103	44.2
IT	18,216	12.1	626	14.0	19,773	13.9	778	17.3
CY	235	28.0	4	50.0	275	33.6	5	70.4
LV	866	20.7	14	:u	860	22.7	17	40.8u
LT	1,355	47.5	36	45.2	1,270	49.4	25	55.6
LU	160	22.8	6	25.4u	169	22.2	5	32.1
HU	3,092	17.9	121	16.2	3,416	18.4	176	18.8
NL	6,210	26.6	274	30.4	6,758	28.6	315	40.6
AT	3,095	10.4	134	11.0	3,228	20.2	165	20.2
PL	13,346	13.8	:	:u	12,189	16.8	:	:u
PT	3,817	10.6	66	17.2u	4,178	11.1	71	21.5
SI	770	17.0	21	17.6u	811	17.7	24	23.1
SK	1,879	13.4	61	16.1	1,866	14.2	70	25.7
FI	1,960	33.9	115	35.3	2,105	37.2	125	50.7
SE	3,534	30.4	195	36.3	3,814	28.5	223	34.1
UK	23,156	31.2	1,300	35.1	23,906	33.1	1,383	38.7
IS	119	23.0	4	32.9	126	27.2	5	35.7
NO	1,910	31.1	72	38.2	1,967	37.1	85	52.6
CH	3,213	25.5	183	25.0	3,308	28.0	199	33.1
BG	2,602	24.1	69	35.8	2,535	27.3	72	37.2
RO	8,649	10.2	165	18.7	7,965	12.3	140	28.7

EU-25 and EU-15 are estimated. Note that EU-25 excludes Poland for ICT-related indicators.
Exceptions to the reference year 1998: DE, LU, UK, IS = 1999; IE, BG = 2000.
Exceptions to the reference year 2002: DE, IE, LU = 2001.
:u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data

This can be corroborated by the data in Table 3.5, which shows there has been a general improvement in the education level of the working population, but particularly

in ICT. Seeing as the type of knowledge measured in this case is formal educational qualifications, this is consistent with recent trends in the numbers of people graduating from tertiary education institutions in Europe, which of course feeds into the labour market. Already between 1998 and 2002, Europe has seen the proportion of its employed population with a tertiary level education increase by 2% from around 23% to 25%. But this growth has been even more evident in the ICT sector. First of all it is more likely that an ICT sector worker in Europe will be tertiary educated (35% of people in the ICT sector have a tertiary education). Second, the ratio of tertiary to non-tertiary educated workers has been increasing at a faster rate in the ICT sector than it has in the economy as a whole. This implies that there is some combination of a higher demand for highly skilled workers in the ICT sector than overall and a higher supply of tertiary educated workers to the ICT sector due to the attractiveness of the sector.

In fact, existence of the tertiary educated is higher in ICT than overall in every country for which data is available. Nowhere in 2002 was there a higher proportion of highly qualified workers in the overall economy compared to the ICT sector. Further evidence of a rapidly changing composition of the ICT sector work force is underlined by the cases of Lithuania, Hungary and to a lesser extent Switzerland, where the proportion of highly-qualified workers was below that of the total economy as recently as 1998. Recalling the grid in Figure 3.2, which showed both intensity and growth in the intensity of ICT employment, implies that there is no single manifestation of this changing composition in the ICT sector: Hungary has the highest growth rate in ICT employment-intensity and Lithuania the lowest. A closer inspection of the net inflows and outflows (not in table) shows that in the case of Lithuania, the increasing ratio of tertiary to non-tertiary educated in the ICT sector is the result of a sector that has been contracting at a faster pace for the non-tertiary educated. Or, in other words, that people without a tertiary education are more likely to have been fired from their jobs. On the other hand, in Hungary, it is the result of a fast growing sector, generally, but in which recruitment has focused increasingly upon the tertiary educated (though nevertheless remains, in 2002, significantly below the European average).

In essence, these measurements of the changing composition of the ICT sector are net flows. Over time, they allow an insight into what, on aggregate, is occurring in the ICT sector in the various European countries, even if they do not tell us exactly how many people are leaving the ICT sector and how many are entering.

3.2.5 ICT and occupations

Measuring the number of workers and also growth in the ICT sector means that the sector is considered as a whole. The ICT sector of course employs people in ICT-related occupations, but it is also a motor of growth for other occupations too. Table 3.6 provides an overview of the different occupations in the European ICT sector in 2002 (at the ISCO 1 digit level). Sample sizes dictate that this differentiation is kept to a minimum level.

At the European level, there is a roughly equal distribution between people employed as professionals, as technicians or as clerks (between 21 and 23%). Sweden (38%), followed by Finland (34%) has the highest proportion of their workers in the ICT working as professionals. Whereas Italy (40%), followed by Austria (322%) have the highest proportion of workers in the ICT sector employed as technicians or associate professionals. In Greece (38%) and Belgium (36%) a high proportion of those employed in the ICT sector were working as clerks in 2002.

Table 3.6 ICT workers by occupation (% of total) - European countries, 2002

	ICT workers in 2002 by occupation (%)								
	Legislators, senior officials and managers	Professionals	Technicans and associate professionals	Clerks	Service workers, etc.	Skilled agri-cultural and fishery workers	Craft and related trade workers	Plant and machine op-erators and assemblers	Elementary occupations
EU-25	11	21	22	23	:u	:u	10	7	5
EU-15	11	22	22	23	:u	:u	9	6	5
BE	11	29	11	36	:u	:	2u	6	4
CZ	7	16	25	25	1	:	13	11	3
DK	11	25	25	25	:u	:	5u	5u	3u
DE	8	21	24	23	1	:	14	6	3
EE	:u	:u	:u	:u	:u	:	:	:u	:u
GR	9	16	13	38	:u	:	19	:u	:u
ES	5	24	26	28	1u	:	12	3	2
FR	8	27	23	29	0u	:u	5	6	2
IE	17	24	7	18	:u	:	10	18	5
IT	4	6	40	28	2	:	10	5	5
CY	:u	28u	23u	31u	:u	:	:u	:	:
LV	:u	:u	29u	:u	:u	:	:u	:u	:
LT	:u	:u	:u	27	:u	:	:u	21	:u
LU	:u	22u	20u	33	:u	:	:u	:u	:u
HU	9	11	15	24	:u	:	18	18	3
NL	17	31	17	19	2u	:	8	5	2u
AT	8	9	32	28	:u	:	14	6	3
PL	:	:	:	:	:	:	:	:	:
PT	:u	13u	27	34	:u	:	:u	:u	:u
SI	10u	17u	18u	33u	:	:u	11u	9u	:u
SK	9	13	27	20	:u	:	10	14	6u
FI	17	34	14	16	:u	:	7	6	5
SE	6	38	24	19	:u	:	5	6	2
UK	23	21	11	12	:u	:	9	8	14
IS	:u	29	:u	23	:u	:	:u	:u	:u
NO	11	31	26	25	:u	:	:u	:u	:u

Table 3.6 ICT workers by occupation (% of total) - European countries, 2002. Continued

	ICT workers in 2002 by occupation (%)								
	Legislators, senior officials and managers	Professionals	Technicans and associate professionals	Clerks	Service workers, etc.	Skilled agri-cultural and fishery workers	Craft and related trade workers	Plant and machine op-erators and assemblers	Elementary occupations
CH	10	28	10	22	:u	:u	16	4u	8
BG	11u	15	17	22	:u	:	17	:u	10u
RO	2	26	8	29	:u	:	22	8	5

Exceptions to the reference year 2002: DE, IE, LU = 2001.
:u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data

Chapter
4

Gender and age in the ICT sector

Questions of gender and age are of crucial importance to the continued development of the ICT sector in Europe. This is not merely, though does include, a question of social justice. But it is also an issue of economic importance. If growth in the ICT sector is to continue, then it is fundamental that the ICT sector makes better use of its available resources. This is underlined in recent EU policy such as the *Community Framework Strategy on Gender Equality 2001-2005* (Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions, 2000), which emphasises that the knowledge-based economy cannot afford to underutilise the untapped potential of its female population and stresses the importance of attracting more women to ICT professions. Moreover, *The Strategy for Jobs in the Information Society* aims at reducing the gender gap and supporting gender desegregation, especially in sectors where women are underrepresented.

4.1 The Belgian perspective

According to the Datawarehouse, 56.7% of employees in Belgium are male (Table 4.1). It is interesting to note that the ICT sector is even more male dominated: only three out of ten employees in ICT are women. Only the industrial sectors (for example, the *metal* sector and the *construction industry*) are even more male-dominated. A second observation is that not all sectors within ICT display the same distribution between men and women. The global distribution is particularly influenced by *Telecommunications (NACE 64.2)* and (*hardware and software*) *Consultancy (NACE 72.1 and 72.2),* both of which show a strong overrepresentation of men.

With regard to the age distribution, we note that youngsters occupy an average proportion of the ICT jobs but that older people are underrepresented: barely 21% of the employees in ICT are older than 45 compared to approximately 29% for the total economy (Table 4.1). Even the 35 to 44 year olds are slightly underrepresented. This means that the group of 25 to 34 year olds is strongly overrepresented. Here again, we can establish important differences between various sectors within ICT. The proportion of older people in the *Consultancy* (NACE 72.1 and 72.2) subsector is notably lower while it is higher in *Manufacturing (STILE 1.1)* and *Telecommunications (STILE 1.2).* The predominance of the 35 to 34 year olds is especially high in *Computer and related activities (STILE 1.3).*

Table 4.1 Distribution of employees according to gender, age and ICT sector - Belgium, average quarter 2000

NACE/sector	Total		Men	Women	15-24 years	25-34 years	35-44 years	45-64 years
	(n)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
30.0	456	0.5	56.5	43.5	9.2	45.8	34.2	10.8
32.1	5,077	5.7	65.5	34.5	14.8	32.1	27.5	25.6
32.2	7,953	8.9	73.9	26.1	9.0	29.0	27.4	34.6
32.3	6,217	7.0	57.2	42.8	12.4	34.8	30.1	22.8
33.1	*2,836*	*:*	*59.8*	*40.2*	*14.4*	*32.9*	*29.7*	*23.0*
33.2	1,524	1.7	65.8	34.2	12.0	34.2	31.9	21.9
33.3	1,103	1.2	82.3	17.7	12.8	38.7	29.5	19.0
33.4	*623*	*:*	*49.8*	*50.2*	*14.0*	*33.0*	*33.4*	*19.7*
33.5	*340*	*:*	*73.0*	*27.0*	*8.8*	*45.4*	*29.1*	*16.7*
64.1	*49,368*	*:*	*68.8*	*31.2*	*5.4*	*21.9*	*26.5*	*46.3*
64.2	30,811	34.5	70.0	30.0	10.2	31.8	28.6	29.4
72.1	13,229	14.8	73.1	26.9	11.8	54.0	24.8	9.4
72.2	17,607	19.7	75.5	24.5	14.1	51.9	24.5	9.4
72.3	2,196	2.5	67.8	32.2	7.1	35.4	34.6	22.9
72.4	1,102	1.2	56.1	43.9	12.8	57.0	22.0	8.1
72.5	1,877	2.1	77.9	22.1	22.5	43.3	24.4	9.8
72.6	193	0.2	71.0	29.0	20.6	57.7	19.1	2.6
ICT 2 digits	*142,512*	*:*	*69.7*	*30.3*	*9.6*	*33.5*	*27.0*	*29.8*
ICT 3 digits	**89,345**	**100.0**	**70.7**	**29.3**	**11.8**	**39.9**	**27.2**	**21.1**
STILE 1.1	22,330	25.0	66.9	33.1	11.7	32.5	28.7	27.1
STILE 1.2	30,811	34.5	70.0	30.0	10.2	31.8	28.6	29.4
STILE 1.3	36,205	40.5	73.7	26.3	13.2	51.4	25.1	10.2
Total economy	**3,235,914**	**:**	**56.7**	**43.4**	**11.6**	**29.3**	**30.5**	**28.6**

Note: Non-ICT sectors which are included in the ICT definition based on two digit NACE codes, but excluded from the definition based on the three digit level, are in italics.
Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

If we distribute all employees in ICT in Belgium according to gender, age and sector, the following picture emerges.

Approximately 47% of employees in the Belgian ICT sector are men aged between 25 and 45 (Table 4.2). It is a strong overrepresentation compared to the total number of employees in the same age group (33%). Hardly 20% are women between 25 and 45 years old, which in turn is a strong underrepresentation. In fact, women are underrepresented in the ICT sector in every age group, while men are overrepresented especially in the age group of 25 to 45 year olds.

The largest group of ICT employees are men aged between 25 and 45 working in *Telecommunications* (NACE 64.1) and *Consultancy* (NACE 72.1 and 72.2). Together, they constitute approximately one third of the ICT employees in Belgium. Also the male 45 to 64 year olds working in *Telecommunications* are a significant group (8.2%). Other important employee groups are the men aged between 25 and 64 working in *Manufacturing of radio, television and communication equipment and apparatus* (NACE 32), women aged between 25 and 45 working in *Telecommunications* and *Consultancy* and male youngsters working in *Consultancy* and *Telecommunications*. Together, all these groups constitute almost 75% of all employees in the ICT sector.

Table 4.2 Distribution of employees according to gender, age and ICT sector in % - Belgium, average quarter 2000

NACE/sector	Men				Women				Total
	15-24 years	25-34 years	35-44 years	45-64 years	15-24 years	25-34 years	35-44 years	45-64 years	15-64 years
30.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.5
32.1	0.6	1.2	1.0	0.9	0.2	0.6	0.5	0.6	5.7
32.2	0.5	1.9	1.8	2.4	0.3	0.7	0.7	0.6	8.9
32.3	0.5	1.4	1.1	0.9	0.3	1.0	1.0	0.7	7.0
33.2	0.1	0.4	0.3	0.3	0.1	0.2	0.2	0.1	1.7
33.3	0.1	0.4	0.3	0.2	0.0	0.1	0.1	0.1	1.2
64.2	1.9	6.8	7.3	8.2	1.6	4.2	2.6	2.0	34.5
72.1	1.3	5.8	2.7	1.1	0.5	2.2	1.0	0.3	14.8
72.2	2.2	7.6	3.7	1.5	0.6	2.7	1.2	0.3	19.7
72.3	0.1	0.6	0.6	0.4	0.1	0.3	0.3	0.2	2.5
72.4	0.1	0.4	0.2	0.1	0.1	0.3	0.1	0.0	1.2
72.5	0.4	0.7	0.4	0.2	0.1	0.2	0.1	0.0	2.1
72.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
ICT 3 digits	**7.9**	**27.4**	**19.3**	**16.1**	**3.9**	**12.5**	**7.9**	**4.9**	**100.0**
STILE 1.1	2.0	5.4	4.6	4.7	1.0	2.7	2.6	2.0	25.0
STILE 1.2	1.9	6.8	7.3	8.2	1.6	4.2	2.6	2.0	34.5
STILE 1.3	4.0	15.2	7.5	3.2	1.4	5.6	2.7	0.9	40.5
Total economy	**6.4**	**15.8**	**16.9**	**17.6**	**5.2**	**13.5**	**13.6**	**11.0**	**100.0**

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

4.2 The European perspective

Though there are country differences, the ICT sector in Europe can be characterised by its male dominated nature (Table 4.3). On average, only one in three ICT jobs is held by a woman. The most extreme cases of gender inequality can be found in the Netherlands and Greece, where less than one quarter of all people working in the ICT sector are women, although the United Kingdom, Belgium and Cyprus are not far off this low.

At the other end of the scale, the economies that have the most gender equality in their ICT employment structures are the new Member States. The top seven are Slovakia, Bulgaria, Czech Republic, Lithuania, Hungary, Latvia and Romania, with proportions of women among total ICT employment ranging between 44% and 52%. Next, is Portugal, which has the highest ratio of women to men employed in the ICT sector among the EU-15 (40%), closely followed by France (38%).

But if there are strong country differences between the proportions of men and women working in ICT, there are on average similarities in the distribution of these workers among age cohorts. Although it is unsurprising that ICT workers generally fall into the younger cohorts, in the EU-25, more than one in every three jobs in the ICT sector is carried out by someone in the 25-34 year old age bracket and 70% of all ICT jobs are held by people aged between 25 and 44. Again, there are country differences according to gender and age. For example, Romania, Cyprus and Ireland are the most likely to have a high proportion of young male ICT workers, with 25-34 year old men accounting for around 50% of all male ICT jobs. In Romania and Cyprus, this trend towards the younger cohorts does not hold true for women, or at least to the same extent (25-34 year old women account for 40% or less of all ICT jobs held by

women). In Ireland, on the other hand, the trend is even more accentuated. Around six out of every ten jobs held by women in the ICT sector was carried out by a 25-34 year old. Other than in Ireland, female ICT employment is skewed towards 25-34 year olds in Portugal, Spain and Slovenia (all above 50% of total female ICT employment).

In terms of an ageing ICT work force, Bulgaria and Denmark have the highest proportions of male ICT workers in the 45-64 year old age bracket (41% and 40% respectively), while for women, Latvia and Bulgaria have the highest proportions of 45-64 year old female ICT workers (60% and 50% respectively). In Germany and the UK, which have by far the highest overall numbers of workers in the ICT sector, employment in 2002 was geared towards the 35-44 year old cohort, for both men and women.

Table 4.3 ICT employment by gender and age - European countries, 2002

	Men				Women				Among total ICT employed aged 25-64 (%)
	25-64 1,000s	25-34 %	35-44 %	45-64 %	25-64 1,000s	25-34 %	35-44 %	45-64 %	
EU-25	4,775	36	34	30	2,320	36	34	29	33
EU-15	4,518	35	34	30	2,074	37	35	29	31
BE	135	37	33	30	47	40	35	25	26
CZ	85	47	23	30	86	28	30	42	50
DK	87	29	31	40	44	34	44	22	33
DE	1,054	32	38	30	524	32	37	31	33
EE	:u	:u	:u	:u	12	:u	:u	47u	:
EL	55	35	29	35	18	39	34	27	24
ES	271	46	30	24	131	54	29	16	33
FR	657	36	32	32	398	33	34	33	38
IE	70	48	32	21	37	59	26	15	35
IT	530	36	33	31	248	40	35	25	32
CY	3	51	28	21u	1u	46u	50u	:u	26
LV	10	:u	:u	:u	8	:u	:u	60u	45
LT	12	:u	46	:u	12	42	:u	:u	49
LU	4	43	29	28u	1u	:u	40u	:u	28
HU	94	46	26	28	82	39	24	38	46
NL	240	36	33	31	75	34	41	25	24
AT	117	38	35	27	49	38	36	26	30
PL	:	:	:	:	:	:	:	:	:
PT	43	45	25u	30u	28	58	:u	:u	40
SI	15	44u	25u	32u	9u	51u	36u	13u	36
SK	34	37	30	33	36	36	36	28	52
FI	80	42	29	28	45	38	30	32	36
SE	148	35	29	36	75	32	34	34	34
UK	1,027	34	36	31	356	35	35	30	26
IS	3	39	32	:u	2	:u	:u	:u	33
NO	58	40	33	27	27	33	30	37	32
CH	132	34	33	33	66	31	38	31	33
BG	35	36	24u	41	37	21u	29	50	52
RO	79	52	22	26	61	37	36	27	44

EU-25 and EU-15 are estimated.
Exceptions to the reference year 2002: DE, LU = 2001.
:u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data

Comparing the distribution of ICT employment by gender and age with total employment in the various Member States serves to underline the degree to which ICT attracts a younger work force (Table 4.4). For total employment, 29% of working men

aged 25-64 at the European level fall into the 25-34 year old age bracket (in the ICT sector 25-34 year olds account for 36% of jobs). The same proportion holds true for 25-34 year old women. In fact, the only exception to this trend is in Bulgaria, where women aged 25-34 and working in ICT represent a lower proportion of all women working in ICT than is the case for total employment.

Table 4.4 Total employment by gender and age - European countries, 2002

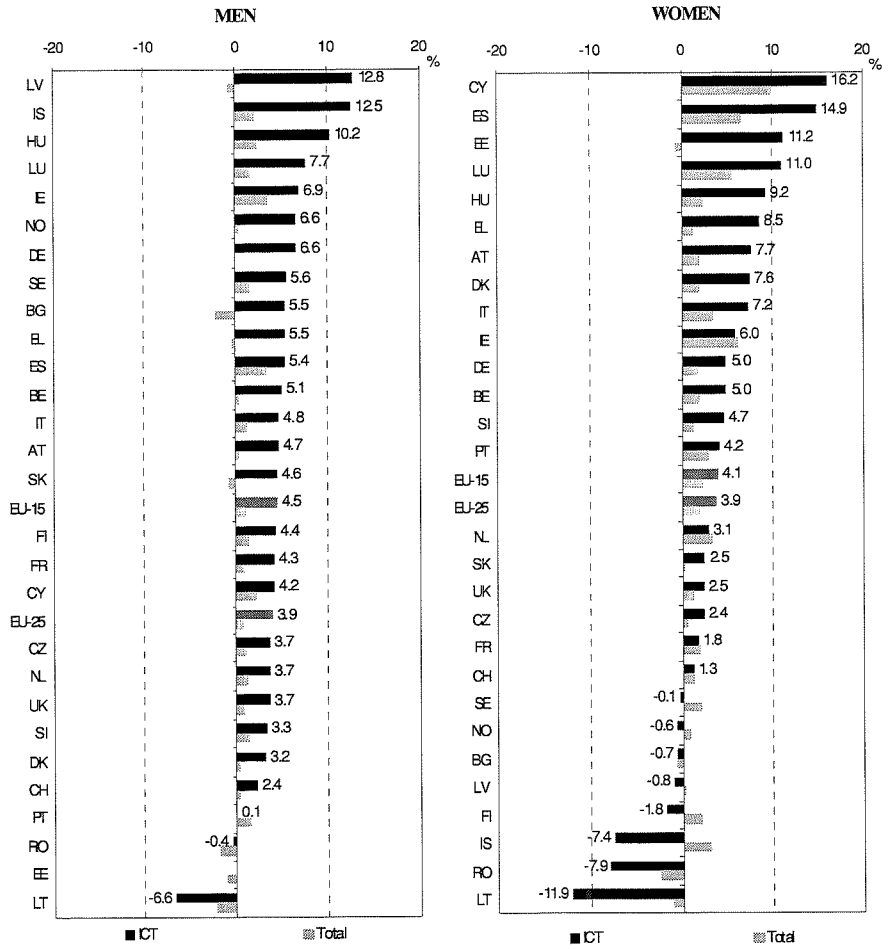
	Men				Women				Among total employed aged 25-64 (%)
	25-64 1,000s	25-34 %	35-44 %	45-64 %	25-64 1,000s	25-34 %	35-44 %	45-64 %	
EU-25	95,452	29	32	39	72,791	29	33	38	43
EU-15	81,653	28	32	39	61,149	30	33	38	43
BE	2,119	29	34	37	1,557	33	35	32	42
CZ	2,391	31	26	42	1,850	26	30	44	44
DK	1,244	26	29	45	1,089	28	31	41	47
DE	17,951	26	34	41	14,063	26	34	39	44
EE	257	31	30	39	256	24	29	47	50
EL	2,165	28	29	43	1,335	30	33	37	38
ES	9,003	32	31	36	5,343	38	32	30	37
FR	11,751	29	32	39	9,839	28	32	39	46
IE	826	33	29	38	588	39	29	32	42
IT	12,325	29	33	38	7,448	33	34	33	38
CY	155	28	32	40	120	34	33	33	44
LV	431	32	29	39	430	26	32	42	50
LT	638	30	34	36	632	29	34	37	50
LU	102	31	35	34	66	38	36	27	39
HU	1,873	35	27	38	1,542	29	30	41	45
NL	3,865	28	32	40	2,893	32	33	35	43
AT	1,782	29	36	35	1,446	32	36	32	45
PL	6,606	32	32	36	5,583	29	33	38	46
PT	2,264	31	30	39	1,914	32	30	38	46
SI	436	30	30	40	375	31	35	33	46
SK	1,013	32	31	37	853	28	36	36	46
FI	1,089	25	31	44	1,016	23	30	47	48
SE	1,980	26	28	46	1,834	25	28	47	48
UK	13,188	29	32	40	10,717	27	32	41	45
IS	67	28	31	41	59	27	30	43	47
NO	1,047	29	29	42	920	28	30	42	47
CH	1,829	26	32	43	1,479	27	32	41	45
BG	1,324	28	30	42	1,211	27	31	41	48
RO	4,323	37	26	36	3,643	36	27	37	46

EU-25 and EU-15 are estimated. Note that EU-25 excludes Poland for % by age for sake of comparison with ICT workers in Table 4.3.
Exceptions to the reference period 2002: DE, LU = 2001.
Source: EU LFS, spring data

Figure 4.1 sets the number and proportion of ICT workers in 2002 within the context of recent growth. At the European level, annual average growth in ICT employment between 1998 and 2002 has outstripped total employment growth for both men and women. The number of men employed in the ICT sector has increased at an annual average rate of 3.9% in the EU-25 compared with 1% for overall employment. The only exceptions to this positive performance in the ICT sector for men were Portugal, where ICT employment grew at a slower rate than total employment, and Lithuania, where job losses in the ICT sector were higher than for total employment. In Latvia, Bulgaria, Greece and Slovakia, ICT employment for men even grew at an annual av-

erage rate of between 4.6% and 12.8%, whilst growth in the overall number of jobs was either stagnant or negative.

Figure 4.1 Annual average growth of ICT sector and total employment by gender - European countries, 1998-2002



EU-25 and EU-15 are estimated. EU-25 excludes Poland.
Exceptions to the reference period 1998-2002: DE, LU = 1998-2001; EU-25, CY = 1999-2002; BG = 2000-2002.
Data for male ICT employment in EE is unreliable. Data for LV, CY, LU, SL should be treated with caution.
Source: EU LFS, spring data

For women, though there has been relatively high growth in the number of jobs in the ICT sector, the degree to which this has outperformed total employment growth should be weighed against the fact that the number of women employed in the ICT sector is relatively low and is therefore more sensitive to change (recall Table 4.3). Seen in this context, the growth rate of 3.9% for ICT sector employment compared to the 2.1% for total employment seems more tempered (though it is worth noting that

total employment growth has been high - twice as much between 1998 and 2002 for women than it has for men). This is also underscored by the more frequent occurrences of total employment growth being higher than ICT employment growth. In all, there are nine countries where this is the case, ranging from Ireland, where an already healthy ICT employment growth is outperformed by even stronger general job growth, to Lithuania, where the number of ICT jobs held by women fell at an annual average rate of 12%. In France and Switzerland the number of women working in ICT and overall grew at a similar rate (1.8% and 1.3%, respectively), whilst in Bulgaria, both fell at a rate equivalent to -0.7% per annum.

Growth in the number of ICT sector jobs has generally been higher for men than for women, which means that if these trends continue, what is already a male dominated sector will become increasingly so in the future. There are nine countries where growth in the number of ICT jobs has been higher for women than for men. But, often this is in countries where women are already a significant minority in the ICT sector as indicated by the data in Table 4.3. One example is Greece, where growth in the number of ICT sector jobs was 8.5% for women between 1998 and 2002 compared to 5.5% for men, but where women only accounted for 24% of all ICT sector jobs in 2002. At those rates, it will be some time before there is more gender equality in the ICT sector.

Chapter
5

Working patterns in the ICT sector

A frequently suggested phenomenon linked to the growth of an industry focused on Information And Communication Technologies is the breakdown in traditional working conditions, or in other words, that 'ICT supports and fosters the implementation of flexible work forms and increases their efficiency' (Valenduc & Vendramin, 2002). This chapter looks in more detail at the effect a growing ICT sector in Europe has had on working patterns.

5.1 The Belgian perspective

5.1.1 ICT and part-time employment

The ICT sector has remarkably few part-time employees compared to other sectors. Only 6.4% of ICT employees work part-time, compared to the average ratio of 22.1% (see Table 5.1). Only in NACE 32.3, 33.2, 72.3 and 72.4, does more part-time work take place compared to the other ICT sectors.

Part-time work is generally carried out by women: globally, 42.3% of women work part-time compared to 6.9% of men. The situation does not differ in ICT: 17.8% of the women work part-time, compared to 1.7% of the men. Women in the ICT sector are nevertheless much less likely to work part-time than their colleagues in other sectors (17.8% compared to 42.3%). The lowest proportion of part-time employment among women can be found in the largest ICT subsector, i.e. *Telecommunication* (NACE 64.2).

As a general rule, the proportion of part-time work increases with age up to the 35 to 44 year olds and it decreases for the age group 45 and over. The telecommunication sector is an exception as the proportion of 15 to 24 year olds is actually the highest there. A possible explanation for the latter is students working part-time.

Table 5.1 Proportion of part-time employees according to gender, age and ICT sector - Belgium, average quarter 2000

NACE/sector	Total number of employees (n)	Total (%)	Men (%)	Women (%)	15-24 years (%)	25-34 years (%)	35-44 years (%)	45-64 years (%)
30.0	456	8.1	1.7	16.6	1.2	6.5	11.1	11.7
32.1	5,077	6.1	1.0	15.9	1.4	3.8	6.6	11.2
32.2	7,953	4.4	0.6	15.2	0.4	3.6	6.8	4.1
32.3	6,217	15.6	2.4	33.5	11.5	13.1	20.8	14.8
33.1	*2,836*	*15.5*	*7.3*	*27.9*	*6.0*	*15.8*	*18.2*	*17.7*
33.2	1,524	11.9	2.5	30.6	0.1	12.0	18.1	9.2
33.3	1,103	6.5	1.1	31.8	4.3	3.9	9.0	9.4
33.4	*623*	*8.0*	*1.0*	*15.2*	*1.4*	*6.3*	*11.6*	*9.6*
33.5	*340*	*6.7*	*2.1*	*19.2*	*0.0*	*1.8*	*16.8*	*6.2*
64.1	*49,368*	*17.8*	*8.6*	*38.2*	*28.8*	*19.1*	*18.9*	*15.3*
64.2	30,811	4.3	1.5	10.8	5.5	3.5	4.8	4.4
72.1	13,229	6.4	1.9	18.6	1.9	4.3	11.5	10.4
72.2	17,607	6.5	1.9	20.6	2.2	4.9	11.0	9.6
72.3	2,196	11.7	2.8	30.7	1.3	6.0	17.8	14.8
72.4	1,102	9.9	5.0	16.2	6.7	6.6	18.7	14.6
72.5	1,877	4.5	1.3	15.8	1.4	3.0	5.8	14.7
72.6	193	7.6	5.5	12.9	11.3	7.4	2.7	20.0
ICT 2 digits	*142,512*	*10.5*	*4.1*	*25.3*	*8.6*	*8.3*	*12.7*	*11.6*
ICT 3 digits	**89,345**	**6.4**	**1.7**	**17.8**	**3.7**	**4.9**	**9.2**	**7.0**
STILE 1.1	22,330	8.6	1.3	23.5	4.1	7.2	11.9	8.6
STILE 1.2	30,811	4.3	1.5	10.8	5.5	3.5	4.8	4.4
STILE 1.3	36,205	6.8	2.0	20.1	2.2	4.7	11.7	10.9
Total economy	**3,235,914**	**22.1**	**6.9**	**42.3**	**26.0**	**20.1**	**24.4**	**20.4**

Note: Non-ICT sectors which are included in the ICT definition based on two digit NACE codes, but excluded from the definition based on the three digit level, are in italics.
Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

5.1.2 Company size

The Datawarehouse also contains information on the size of the company for which the employee works. The information is centralised, which means that no data is available about the local establishment the employee is based at but that the employer is used as a general reference point. If an employer has several establishments and various activities, the geographic location of the head office and/or main activity are given.

Overall, approximately 45% of employees in Belgium work in a company employing over 500 people; 38% work in a company with 1,000 or more employees. Approximately 21% are employed in a company with fewer than 50 employees. The ICT sector is only marginally different in this respect: slightly more employees work in a company with over 500 employees (8.6% + 40.2%) and slightly fewer in a company with less than 50 employees (8.7% + 15.3%).

Table 5.2 Distribution of employees in ICT by subsector and company size - Belgium, average quarter 2000

NACE/sector	Total number of employees (n)	(%)	<10 (%)	10-49 (%)	50-99 (%)	100-499 (%)	500-999 (%)	≥1,000 (%)
30.0	456	100.0	7.0	43.4	17.8	31.8	0.0	0.0
32.1	5 077	100.0	0.9	8.5	10.5	22.1	37.3	20.7
32.2	7 953	100.0	0.1	2.2	3.2	2.2	8.0	84.3
32.3	6 217	100.0	0.4	3.8	1.6	5.5	0.0	88.6
33.1	2 836	100.0	32.7	27.2	15.0	25.1	0.0	0.0
33.2	1 524	100.0	5.8	30.8	26.5	36.9	0.0	0.0
33.3	1 103	100.0	10.6	39.3	18.6	31.5	0.0	0.0
33.4	*623*	*100.0*	*3.8*	*34.7*	*29.8*	*31.7*	*0.0*	*0.0*
33.5	*340*	*100.0*	*2.7*	*40.5*	*21.1*	*35.7*	*0.0*	*0.0*
64.1	*49 368*	*100.0*	*1.9*	*1.5*	*0.3*	*2.3*	*3.3*	*90.7*
64.2	30 811	100.0	2.5	5.4	2.4	10.4	9.7	69.6
72.1	13 229	100.0	22.4	30.2	16.6	17.3	4.1	9.3
72.2	17 607	100.0	17.2	28.0	15.1	35.4	4.3	0.0
72.3	2 196	100.0	8.3	25.2	13.6	14.8	38.1	0.0
72.4	1 102	100.0	20.0	28.3	16.8	34.8	0.0	0.0
72.5	1 877	100.0	8.9	9.7	3.3	78.2	0.0	0.0
72.6	193	100.0	74.9	25.1	0.0	0.0	0.0	0.0
ICT 2 digits	*142 512*	*100.0*	*6.8*	*10.9*	*6.0*	*13.2*	*6.5*	*56.6*
ICT 3 digits	**89 345**	**100.0**	**8.7**	**15.3**	**8.6**	**18.6**	**8.6**	**40.2**
STILE 1.1	22 330	100.0	1.4	8.7	7.1	12.1	11.3	59.4
STILE 1.2	30 811	100.0	2.5	5.4	2.4	10.4	9.7	69.6
STILE 1.3	36 205	100.0	18.5	27.7	14.9	29.6	5.9	3.4
Total economy	**3 235 911**	**100.0**	**14.1**	**17.2**	**6.7**	**16.8**	**7.0**	**38.1**

Note: Non-ICT sectors which are included in the ICT definition based on two digit NACE codes, but excluded from the definition based on the three digit level, are in italics.
Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

However, there are important differences between the various subsectors within ICT. For instance, in the main *industrial branch* of the ICT sector (NACE 32), a much larger proportion of employees are working in very big companies (with over 500 employees). In NACE 32.2 and 32.3, the proportion even lies in the region of 90%. Employees in the *Telecommunication* sector (NACE 64.2), too, often work in companies with over 500 employees (nearly 80%). In both cases, the companies often even employ more than 1,000 employees. However, the sector of *Computers and related activities* (NACE 72) shows a different picture. Let's focus on the consultancy sectors. In *Hardware consultancy* (NACE 72.1), barely 14% work in a company with more than 500 employees. More than half of all employees work in a company with fewer than 50 employees; for 22%, their company has even less than 10 employees. Few *Software consultants* (NACE 72.2) work in large companies. Nearly half work in a company with fewer than 50 employees. The proportion of employees working in a medium-sized company (50 to 500 employees) is slightly larger here.

The picture for men and women working in the ICT sector is barely different. Small disparities emerge between the different age groups. The proportion of employees working in a company with more than 500 employees increases with age. Accordingly, the proportion of employees in *Telecommunications* (NACE 64.2) working in companies with more than 500 employees is higher among the 35 to 44 year olds and the 45 to 64 year olds. The younger age groups are slightly more likely to work in

a smaller company. The same can be observed in *Software consultancy* (NACE 72.2). Younger age groups more often work in smaller companies while older groups more often work in companies with between 50 and 500 employees.

5.2 The European perspective

5.2.1 ICT and temporary work

Table 5.3 compares whether employees are more likely to be on a temporary contract in the ICT sector compared to the overall economy. Far from being a sector that is characterised by job insecurity, the proportion of employees on a temporary contract in the ICT sector in Europe is below the level of the overall economy. Furthermore, over time, the gap has been increasing: the proportion of all employees with temporary contracts was 8.5% in 1998, growing to 9.4% in 2002. To a certain extent, this increase is explained by the high increase in temporary contracts in Poland, which has paralleled an increasing joblessness. But the overall proportion of temporary contracts in the EU-15 has risen too, whilst over the same period, the proportion of employees on a temporary contract in the ICT sector has fallen from 5.6% to 5.3%.

Despite there being an aggregate reduction in the proportion of ICT employees on temporary contracts between 1998 and 2002, looking at the data on a country by country basis reveals a number of features. The first is that the availability of indicators is strongly affected by the quantity of people that fall into this category. For example, in both 1998 and 2002, there are 11 countries for which data cannot be presented because, quite simply, the number of people within the sample is not high enough to ensure a reasonable quality in the results. Though this observation provides little direct information on the characteristics of the ICT work force, it has an important bearing on the interpretation of the results and the degree to which the EU LFS can and should be used as a data source for such detailed ICT worker profiles. It is also worth underlining that this quality consideration is not only dependent on the make-up of the ICT sector by country, but also on the capacity of the Labour Force Survey to capture the information: fewer problems are encountered where the ICT sector is more prevalent and where national LFS samples are larger.

For the remaining countries, a second observation is that the only incidence of a higher proportion of temporary contracts in the ICT sector compared to the overall economy was in the Czech Republic in 1998, though this was no longer the case by 2002. Indeed, as indicated by the European aggregate, the proportion of employees on a temporary contract has generally fallen between 1998 and 2002. The exceptions to this trend were Germany, Spain, Italy, Hungary and Switzerland. Germany, for instance, went from being below the European average in 1998 to above in 2002, with the proportion of its ICT sector employees on temporary contracts rising from 5% to 5.7%. In addition, Spain stands out as being the only country that saw overall job security increase, while decreasing in the ICT sector specifically, as indicated by a simultaneous fall in the proportion of total employees on temporary contracts (from 26.8% to 26.4%) and rise of this same ratio in the ICT sector (from 18.2% to 19.9%).

Table 5.3 Number of employees and % of which on a temporary contract in the ICT sector and overall - European countries, 1998 and 2002

	1998				2002			
	Total employees		ICT employees		Total employees		ICT employees	
	1,000s	% temporary contract	1,000s	% temporary contract	1,000s	% temporary contract	1,000s	% temporary contract
EU-25	131,339	8.5	5,568	5.6	139,679	9.4	6,569	5.3
EU-15	110,600	9.2	5,180	5.7	119,564	9.5	6,105	5.4
BE	2,880	5.7	140	3.7	3,084	5.4	172	3.4
CZ	3,506	5.2	138	6.2	3,532	6.6	153	4.7
DK	1,980	6.5	104	4.5u	2,111	6.1	124	:u
DE	27,644	6.7	1,225	5.0	28,244	6.8	1,463	5.7
EE	481	1.2u	12	:u	474	1.8u	16	:
EL	1,963	11.3	52	:u	2,100	9.5	66	:u
ES	9,152	26.8	272	18.2	11,417	26.4	374	19.9
FR	17,720	9.9	898	6.3	19,123	10.2	1,023	5.3
IE	917	5.1	78	3.8u	1,139	3.3	100	:u
IT	12,933	6.7	546	3.3	14,349	8.2	658	4.0
CY	177	8.4	4	:u	210	8.7	4	:u
LV	726	7.3	14	:u	748	10.8	16	:u
LT	1,097	5.5	33	:u	1,005	6.9	24	:u
LU	139	1.7	4	:u	156	2.8	5	:u
HU	2,559	5.7	109	4.3	2,917	6.4	161	4.8
NL	5,426	8.2	264	7.2	5,895	9.4	292	5.8
AT	2,633	3.9	126	2.7	2,759	2.8	152	2.1
PL	9,823	4.3	:	:	8,841	12.0	:	:
PT	2,738	13.3	61	:u	3,116	17.4	66	16.1u
SI	635	7.5	19	:u	689	10.0	22	7.2u
SK	1,738	3.3	58	:u	1,698	3.8	67	:u
FI	1,665	14.4	111	9.7	1,821	12.5	120	5.6
SE	3,138	9.6	188	4.2	3,412	10.7	209	3.0
UK	19,672	5.9	1,113	4.8	20,838	4.9	1,281	2.7
IS	90	4.1	4	:	102	4.0	4	:
NO	1,740	7.5	71	:u	1,810	7.3	81	:u
CH	2,623	5.1	165	3.2u	2,726	5.3	180	3.9u
BG	:	:	:	:	2,155	5.5	71	:u
RO	5,718	2.1	164	:u	5,314	0.7	137	:u

EU-25 and EU-15 are estimated. Note that EU-25 excludes Poland for ICT-related indicators.
Exceptions to the reference year 1998: CY = 1999.
Exceptions to the reference year 2002: DE, LU = 2001.
: = not available; :u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data

5.2.2 ICT and part-time employment

But if workers in the ICT sector have a greater amount of job security than is the average, so too are they more likely to be employed on a full-time basis. As is shown by Table 5.4, at the aggregate level, part-time work in ICT and overall also seems to follow similar trends to the type of contract held. That is to say that whilst the proportion of people working part-time has generally increased in Europe between 1998 and 2002, in the ICT sector it has fallen. Though this provides no indication of when the hours are worked (i.e. late, night, weekends) and therefore the flexibility of the sector, it does at least suggest that the ICT sector is more demanding in terms of the number

of hours it requires from its workers. In fact, the Czech Republic is the only country of all those for which data is available that shows a ratio of part-time workers that is higher in the ICT sector than overall. It has however reduced marginally since 1998 and was still some distance below the European average in 2002 at 5.7%, compared with 4.8% for total employment. Sweden and the UK had higher rates of total employed as part-time workers than the average for Europe, yet lower when it came to the ICT sector.

Table 5.4 Number of employed and % of which working part-time in the ICT sector and overall - European countries, 1998 and 2002

	1998				2002			
	Total employment		ICT employment		Total employment		ICT employment	
	1,000s	% part-time	1,000s	% part-time	1,000s	% part-time	1,000s	% part-time
EU-25	159,969	14.8	5,989	9.9	168,243	15.3	7,095	9.4
EU-15	133,803	16.3	5,568	10.2	142,802	16.9	6,592	9.8
BE	3,515	15.5	150	6.3	3,676	19.4	182	9.9
CZ	4,093	5.5	151	7.1	4,242	4.3	171	5.7
DK	2,225	17.0	109	13.3	2,333	15.2	131	6.3
DE	31,255	18.9	1,324	13.9	32,013	20.8	1,578	14.0
EE	529	6.1	13	:u	512	5.7	16	:u
EL	3,456	5.0	57	:u	3,500	3.9	73	:u
ES	12,033	7.1	294	2.5	14,346	7.2	401	3.2
FR	20,367	16.3	926	11.2	21,589	15.7	1,055	9.5
IE	1,181	15.4	83	4.5u	1,414	15.2	107	5.1
IT	18,216	7.1	626	3.2	19,773	8.4	778	5.0
CY	235	5.2	4	:u	275	6.5	5	:u
LV	866	11.0	14	:u	860	8.1	17	:u
LT	1,355	7.9	36	:u	1,270	9.4	25	:u
LU	154	9.6	4	:u	169	11.4	5	:u
HU	3,092	3.7	121	2.9u	3,416	3.4	176	3.0
NL	6,210	34.2	274	21.7	6,758	39.3	315	20.9
AT	3,095	16.5	134	9.1	3,228	19.8	165	12.1
PL	13,346	8.3	:	:	12,189	8.3	:	:
PT	3,817	9.2	66	:u	4,178	8.5	71	:u
SI	770	5.5	21	:u	811	4.5	24	:u
SK	1,879	2.4	61	:u	1,866	1.9	70	:u
FI	1,960	8.7	115	5.9	2,105	9.1	125	5.7
SE	3,534	21.7	195	10.9	3,814	17.9	223	7.3
UK	22,787	22.7	1,211	10.4	23,906	22.6	1,383	9.2
IS	114	25.9	4	:u	126	22.6	5	:u
NO	1,910	23.1	72	13.1	1,967	22.2	85	10.5
CH	3,213	30.0	183	21.6	3,308	32.3	199	20.7
BG	2,602	:	69	:	2,535	2.6	72	:u
RO	8,649	12.4	165	:u	7,965	9.2	140	1.7

EU-25 and EU-15 are estimated. Note that EU-25 excludes Poland for ICT-related indicators.
Exceptions to the reference year 1998: CY = 1999; LT = 2000.
Exceptions to the reference year 2002: DE, LU = 2001.
: = not available; :u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data

It is noticeable that part-time work is a phenomenon much more prevalent in the EU-15 than in the new Member States or Candidate Countries. In 2002, the only countries to have overall ratios of part-time workers in excess of 10% were from the EU-

15, or EFTA. The same is true in the ICT sector. The Netherlands has a particularly high proportion of people working part-time in the ICT sector and especially overall. In 2002, nearly four in every ten people employed in the Netherlands were working part-time, as were two in ten in the ICT sector. The reason is that an extremely high proportion of employed women in the Netherlands is working part-time (73% in 2002, not in table). The same is true in Switzerland where, overall, 62% of employed women were working part-time in 2002.

5.2.3 ICT and entrepreneurship

Another pertinent indicator concerns the proportion of people that are self-employed in the ICT sector, how this is changing over time and how it compares with the economy as whole. Change in the proportion of people that are self-employed is an indicator of the degree to which there are increasing or decreasing levels of entrepreneurship. It is a little surprising that the differences between levels of entrepreneurship for the economy overall and for the ICT sector are as prevalent as they appear to be. At the European level, even though entrepreneurship has increased marginally in the ICT sector between 1998 and 2002 (from 6.8% to 7.2%) it still remains at less than half of the level evident for the overall economy, which itself has fallen over the same time period (15.3% in 2002). In fact, there is not one country where entrepreneurship is higher in the ICT sector than overall, either in 1998 or 2002. It should nevertheless be underscored that differences are decreasing slightly. Of the 20 countries which can be contrasted, the difference between self-employment in ICT and overall was greater in 2002 for only four of them in comparison to 1998. In other words, 16 saw the disparity between self-employment in the ICT sector and overall reduce during that time period.

Economies with higher than average proportions of self-employed overall do not necessarily follow suit in the ICT sector, and vice versa. For example in 2002, Spain, Ireland and Romania have above average levels of self-employment if the total economy is considered, yet below average levels of self-employment in the ICT sector in particular. On the other hand, Hungary, the Netherlands, Austria, Slovenia and the UK are all more likely to be above the European average of self-employment in the ICT sector (sometimes marginally), yet below it for total employment.

Table 5.5 Number of employed and % of which self-employed in the ICT sector and overall - European countries, 1998 and 2002

	1998				2002			
	Total employment		ICT employment		Total employment		ICT employment	
	1,000s	% self-employed	1,000s	% self-employed	1,000s	% self-employed	1,000s	% self-employed
EU-25	159,969	16.1	5,989	6.8	168,243	15.3	7,095	7.2
EU-15	133,803	15.6	5,568	6.7	142,802	14.8	6,592	7.2
BE	3,515	16.0	150	6.3	3,676	14.2	182	5.3
CZ	4,093	13.9	151	8.5	4,242	16.1	171	10.2
DK	2,225	9.7	109	4.8u	2,333	8.7	131	4.7u
DE	31,255	10.7	1,324	7.2	32,013	10.7	1,578	7.0
EE	529	8.3	13	:u	512	7.1	16	:u
EL	3,456	34.1	57	7.6u	3,500	33.2	73	8.0
ES	12,033	21.6	294	7.0	14,346	18.9	401	6.6
FR	20,367	11.4	926	2.9	21,589	10.3	1,055	3.0
IE	1,181	21.2	83	6.6	1,414	18.7	107	7.2
IT	18,216	25.4	626	12.3	19,773	23.9	778	14.9
CY	235	22.7	4	:u	275	20.5	5	:u
LV	866	11.5	14	:	860	9.5	17	:u
LT	1,355	16.6	36	:u	1,270	17.7	25	:u
LU	154	9.0	4	:u	169	7.1	5	:u
HU	3,092	16.6	121	9.9	3,416	14.0	176	8.2
NL	6,210	11.6	274	3.6u	6,758	12.1	315	7.5
AT	3,095	12.3	134	4.6	3,228	12.1	165	7.4
PL	13,346	23.0	:	:	12,189	23.3	:	:
PT	3,817	26.1	66	:u	4,178	23.9	71	:u
SI	770	13.0	21	9.5u	811	11.9	24	8.0u
SK	1,879	7.4	61	4.7u	1,866	8.9	70	4.0u
FI	1,960	14.7	115	3.5u	2,105	13.2	125	4.0
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UK	22,787	13.2	1,211	8.0	23,906	12.5	1,383	7.3
IS	114	20.5	4	:u	126	18.5	5	:u
NO	1,910	8.3	72	:u	1,967	7.5	85	:u
CH	3,213	16.3	183	8.9	3,308	15.7	199	8.9
BG	2,602	14.2	69	:u	2,535	13.3	72	:u
RO	8,649	19.4	165	:u	7,965	21.3	140	2.5

EU-25 and EU-15 are estimated. Note that EU-25 excludes Poland for ICT-related indicators.
Exceptions to the reference year 1998: CY = 1999; BG = 2000.
Exceptions to the reference year 2002: DE, LU = 2001.
: = not available; :u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data

Chapter
6

Mobility in the ICT sector: inflows and outflows

As previously underlined, the recent Commission *Action Plan for Skills and Mobility* calls for greater occupational mobility in order to adapt to structural change, driving such change in a competitive world (and) contributing to a better functioning of labour markets and higher productivity, employment, growth and competitiveness (Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions, 2002a).

A basic assumption of this report is that mobility, on the whole, is positive. But, when too much mobility occurs, and depending on the sector of activity, it is worth underlining that this can also be detrimental. For example, where training costs are high and on-the-job-learning is long, then too high a mobility rate may imply that employers are not getting the maximum from their employees. Where training costs are lower, skills are easily transferable and employees need less time to get up to speed, then a higher mobility rate will increase the dynamism of the sector.

But what is dynamism? A main consideration in the measurement of mobility is the reason behind why people are mobile. Are people mobile because they have previously been fired from another job or are they mobile because they choose to advance their career or to change sector? Whether mobility is voluntary or not is a key issue that cannot be measured using either the Belgian DWH or the EU LFS.[13] Dynamism is characterised by action and, to that end, a dynamic market or sector is one in which change or action frequently occurs. Therefore, from the point of view of the individual, it can be of both a positive nature (voluntary mobility) or a negative nature (forced mobility). Given that there is no means of indicating why the *employed* person left their previous job, it is difficult to make the distinction between mobility of a positive or negative nature.

The remainder of this chapter looks at the flows into and out of the labour market in Belgium, focusing on the ICT sector, as well as the possibility of using the EU LFS. It becomes evident that whilst, in theory, the EU LFS offers the means to calculate indicators on not just mobility in the ICT sector but also the characteristics of the individuals that are mobile, the practical application of these methods often gives inadequate results.

13 A question exists in the EU LFS concerning the main reason for leaving the last job or business with which it is possible to make some distinction between voluntary and involuntary mobility. However, the question is posed only to those people that are not employed during the reference week of the survey and have not been for up to a maximum of eight years.

6.1 The Belgian perspective

6.1.1 Flows into and out of the labour market

The work force of companies or sectors is evidently not static. Every day, new employees start work whereas others leave their job or even the activity sector. Apart from people flowing into a sector (or company) from another wage-earning job, some people naturally flow in from self-employment, unemployment or from being professionally inactive. The same applies to people leaving companies or sectors: some move to another sector or to self-employment, while others leave the gainfully employed segment of the labour market.

A sector's 'work force' is, quantitatively speaking, the net result of the inflow and outflow of employees and is therefore not stable: even an activity sector with an invariable number of employees for years on end is nevertheless influenced by the inflow and outflow of employees. Employees with their knowledge and skills are after all an important base material of the company. When an employee leaves the company, part of that base material is lost. On the other hand, new knowledge and skills enter the company when it takes on new employees. In that sense, personnel management is base material management.

If we wish to gain a better insight into the diffusion of Information Society Knowledge, we must be able to define the transfer of an employee as the transfer of knowledge and skills. This knowledge and skills contain various components, including formal education, work experience, but also personality traits like creativity, analytical thinking, etc. The big challenge is to measure this knowledge and skills through administrative databases. For instance, the Datawarehouse contains no information about the educational attainment or additional training courses followed, nor about the respective positional level or the years of service of the employee in the company. We will therefore base our analysis below on the assumption that every person carries relevant general knowledge with them and every transition therefore results in some knowledge flow.

Since the analysis in this chapter primarily relates to flows into and out of employment, rather than purely flows within employment (i.e. between sectors), the detailed distribution of ICT sectors is not applied at the three digit level of NACE. Instead, the more general distribution into STILE sectors is used so as to compare ICT with others sectors.

6.1.2 Inflow into ICT

We distinguish four inflow channels: inflow from another job (the job-to-job mobile),[14] from self-employment, from unemployment and from the professionally inactive (for example people fulfilling domestic tasks or students).

Of the 3,235,900 employees (on the last day of a quarter in 2000), 225,507 did not yet hold their job during the previous quarter. Seven percent of employees therefore newly flowed into their job during the previous quarter. Approximately 3.4% flowed in from inactivity and 1.1% from unemployment, adding up to a total of 4.5% from a po-

14 Job-to-job mobility is commonly conceived as a change of employer. In the Datawarehouse only data about the individual's legal employer (enterprise) is included and not about the establishment. We measure mobility as a change of the relation between an individual's unique ID-number and his/her employer's unique ID-number. We will examine this in greater detail when focusing on job-to-job mobility further on.

sition of not being in work. Another 0.2% came from self-employment and approximately 2.3% from another paid job. Of the latter group, some even worked in another sector (1.1%). If we want to gain an insight into the proportion of employees who are 'new' to the sector, we must disregard employees changing jobs within the same sector (2.3%-1.1%), which leaves 5.8% of employees who flowed into their current sector of employment in the course of the previous quarter.[15]

The 'new employees' can therefore be looked at from two different angles: from a job perspective or from a sectoral perspective. For example, for STILE sector 1.3 *(Computer and related activities)*, we can say that on the one hand, 9.6% of employees are new to their job and on the other hand, 7.8% of employees are new to the sector. Because our research object is the mobility of employees in ICT, we will focus on the first angle, namely on the employees who are new to their job, regardless of whether their previous job was in the same sector or not. In most of the STILE sectors, the proportion of 'new' employees is somewhat lower than the average of 7%, but a small number stand out: STILE sectors 3.1 *(Wholesale and retail trade, hotels, restaurants)*, 3.4 *(Other services)*, 2.8 *(Construction)*, 1.3 *(Computer and related activities)* and 2.1 *(Agriculture, forestry, fishing)* all have a higher than average proportion of newcomers. The inflow into a job in these sectors from professional inactivity is particularly significant (with the exception of STILE sector 1.3 where the largest inflow channel comes from another job). The inflow percentages from inactivity into *Agriculture, forestry and fishing* (STILE 2.1) and the *Other services* (STILE 3.4) are especially striking. The large inflow into STILE 2.1 is explained by seasonal labour (for instance, fruit picking), the inflow into STILE 3.4 is explained by the presence of NACE sector 74.5 *Labour recruitment and provision of personnel* (interim work); both types of work are characterised by short-term contracts which means that these employees are very mobile in and around the labour market.

15 Methodological observation: the inflow from self-employment, unemployment and professional inactivity is in fact an inflow into socio-economic positions 1.1 (gainful employment) + 1.4.2 (gainful employment combined with self-employment - main job in employment) + 1.4.2 (gainful employment and self-employment - main job is in self-employment) while the inflow from another job as well as the total number of employees is based on the socio-economic positions 1.1 (gainful employment) + 1.4.1 (gainful employment combined with self-employment - main job in employment). This leads to an overestimation of the flows from self-employment, unemployment and professional inactivity to gainful employment: namely the flow from self-employment, unemployment and professional inactivity to socio-economic position 1.4.2. The figures nevertheless indicate that this overestimation is fairly minimal. For example, between the second and third quarter of 2000, 1,761 people moved from self-employment to 1.4.2; two people from unemployment to 1.4.2 and 53 people from professional inactivity to 1.4.2. The discrepancy lies mainly with the self-employed: of the 7,122 self-employed who moved to gainful employment (0.2% in the table), approximately 1,760 in fact go to socio-economic position 1.4.2 while the number of people in 1.4.2 is not contained in the total number of employees. Relative to the total number of people flowing in (225,507), it is only a limited overestimation.

Table 6.1 Inflow rates (into a wage-earning job) by activity sector - Belgium, average quarter 2000

STILE sector	Employees (n)	Total quarterly inflow into job (n)	From other job (%)	Of which in other sector (%)	Self-employed (%)	Unemployment (%)	Inactivity (%)	Total inflow into sector (%)	Total inflow into job (%)
1.1	22,330	877	1.7	1.5	0.1	0.2	1.9	3.8	3.9
1.2	30,811	1,488	2.6	2.2	0.1	0.4	1.7	4.4	4.8
1.3	36,205	3,471	5.4	3.6	0.3	0.5	3.4	7.8	9.6
2.1	22,328	4,757	2.9	1.5	0.5	2.5	15.4	19.8	21.3
2.2	4,003	112	1.2	0.9	0.1	0.5	1.0	2.5	2.8
2.3	136,074	6,415	1.9	1.1	0.1	0.7	2.1	3.9	4.7
2.4	156,781	6,289	1.6	1.2	0.1	0.3	1.9	3.5	4.0
2.5	233,253	8,131	1.5	1.0	0.1	0.4	1.6	3.0	3.5
2.6	57,640	2,311	2.0	1.5	0.1	0.5	1.4	3.5	4.0
2.7	26,595	562	0.7	0.6	0.0	0.4	1.0	2.1	2.1
2.8	179,667	14,079	4.1	1.4	0.2	1.0	2.5	5.1	7.8
3.1	509,646	47,433	3.4	1.3	0.2	1.2	4.5	7.2	9.3
3.2	219,968	11,987	2.8	1.2	0.2	0.7	1.8	3.9	5.4
3.3	128,274	4,834	1.7	0.9	0.1	0.2	1.7	2.9	3.8
3.4	276,635	46,736	3.0	1.8	0.3	3.8	9.8	15.7	16.9
4.1	313,199	14,535	1.2	0.8	0.1	0.7	2.6	4.2	4.6
4.2	10,413	612	2.5	2.2	0.1	0.7	2.6	5.6	5.9
5.1	321,466	18,892	2.0	0.8	0.1	0.9	2.9	4.7	5.9
5.2	529,452	25,361	1.4	0.9	0.1	0.8	2.4	4.2	4.8
5.3	3,141	233	1.7	1.3	0.3	1.3	4.1	7.0	7.4
Total economy	3,235,914	225,507	2.3	1.1	0.2	1.1	3.4	5.8	7.0

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

If we specifically look at the ICT sectors (seet Table 6.2), we note that the inflow from unemployment and professional inactivity lies lower there than the average for all sectors. The inflow from another job is above average in *Computer and related activities* (STILE 1.3) and in *Telecommunications* (STILE 1.2). Assuming that people who flow in from another job bring more up-to-date knowledge with them than unemployed and inactive people, we can say that these ICT sectors 'import' more than an average amount of knowledge.

Remarkable is that most of the people flowing in from another job also flow in from another activity sector. We will return to this issue in the chapter about flows between sectors.

Overall, we see that the total inflow into *Office accounting and computing machinery* (STILE 1.1) and *Telecommunications* (STILE 1.2) is always below (respectively 3.9% and 4.8%) average (7.0%) and that the total inflow into *Computer and related activities* (STILE 1.3) is higher (9.6%) than average, due to the high inflow from another job and the average inflow from professional inactivity. The inflow pattern for *Computer and related activities* (STILE 1.3) consequently deviates from other ICT sectors: both the inflow from professional inactivity and from other gainful employment is significantly higher.

Since age is an important explanatory factor of mobility behaviour in and around the labour market, we will examine the various age groups in greater detail (see Table 6.3). We note that the number of employees flowing in decreases with age: for the youngsters, it is 22.3% of the total number of employees; for the 25 to 34 year olds only 7.8% and the rate decreases to as little as 2.7% for the highest age group. The high proportion of youngsters flowing in is primarily due to a high inflow from inactivity, which in this case is mainly from the education system. But the proportion flowing in from unemployment and from other jobs is also highest among youngsters, falling as age increases. These observations also apply to the ICT sectors. Youngsters who flow in from the education system bring relatively up-to-date knowledge with them, but they don't usually have much experience and know-how. An important proportion of the newly imported knowledge in companies therefore tends to consist of 'textbook knowledge'.

The differences noted earlier between the ICT sectors hold true for all the age groups: the inflow into new jobs is lower in STILE sectors 1.1 and 1.2 and higher in STILE sector 1.3 within each age group.

Table 6.2 Inflow rates (into a wage-earning job) in the ICT sector by age - Belgium, average quarter 2000

STILE sector	Employees (n)	Total quarterly inflow into job (n)	From other job (%)	Of which in other sector (%)	Self-employed (%)	Unemployment (%)	Inactivity (%)	Total inflow into sector (%)	Total inflow into job (%)
15-24 year olds									
1.1	2,606	327	3.2	2.9	0.0	0.6	8.7	12.2	12.5
1.2	3,133	541	6.2	5.4	0.2	1.2	9.6	16.4	17.3
1.3	4,793	1,025	7.5	5.3	0.3	0.7	12.9	19.2	21.4
Total economy	375,379	83,704	4.9	2.6	0.2	2.4	14.8	20.0	22.3
25-34 year olds									
1.1	7,254	355	2.7	2.5	0.1	0.3	1.8	4.7	4.9
1.2	9,807	699	4.7	3.9	0.2	0.6	1.7	6.3	7.1
1.3	18,618	1,706	6.2	4.1	0.2	0.5	2.3	7.1	9.2
Total economy	948,186	73,599	3.2	1.7	0.3	1.5	2.8	6.2	7.8
35-44 year olds									
1.1	6,413	135	1.1	0.9	0.1	0.2	0.7	2.0	2.1
1.2	8,806	195	1.3	1.1	0.1	0.2	0.5	1.9	2.2
1.3	9,104	567	4.0	2.6	0.3	0.5	1.4	4.8	6.2
Total economy	986,896	43,443	1.7	0.8	0.2	0.9	1.6	3.5	4.4
45-64 year olds									
1.1	6,057	60	0.4	0.3	0.0	0.1	0.5	0.9	1.0
1.2	9,066	52	0.3	0.3	0.1	0.0	0.2	0.5	0.6
1.3	3,690	174	2.5	1.7	0.4	0.4	1.4	3.9	4.7
Total economy	925,453	24,762	0.8	0.3	0.2	0.4	1.2	2.2	2.7

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

Table 6.3 Inflow rates (into a wage-earning job) in the ICT sector by gender - Belgium, average quarter 2000

STILE sector	Employees (n)	Quarterly inflow in job (n)	From other job (%)	Of which in other sector (%)	Self-employed (%)	Unemployment (%)	Inactivity (%)	Total inflow into sector (%)	Total inflow into job (%)
Men									
1.1	14,932	579	1.8	1.6	0.1	0.1	1.8	3.7	3.9
1.2	21,561	904	2.4	2.0	0.1	0.2	1.4	3.8	4.2
1.3	26,683	2,576	5.5	3.5	0.3	0.4	3.4	7.6	9.7
Total economy	1,834,642	116,127	2.3	1.1	0.3	0.9	2.9	5.2	6.3
Women									
1.1	7,399	298	1.4	1.3	0.0	0.4	2.2	3.9	4.0
1.2	9,250	583	3.1	2.6	0.1	0.7	2.4	5.8	6.3
1.3	9,522	896	5.2	3.9	0.2	0.6	3.4	8.2	9.4
Total economy	1,401,270	109,379	2.2	1.1	0.2	1.4	4.0	6.7	7.8

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

The differences between men and women remain limited in this respect. In general, the inflow of women (7.8%) is slightly higher than the inflow of men (6.3%). The difference lies mainly in the inflow from inactivity and to a lesser extent from unemployment. These differences between men and women can also be observed in the ICT sectors. Only in *Computer and related activities* (STILE 1.3) is the inflow from inactivity is equal for men and women.

6.1.3 Outflow from ICT

Whereas we distinguished four channels in the inflow into ICT (inflow from another job, from self-employment, unemployment and inactivity), we will only distinguish two channels in the outflow out of a job: 'outflow to another job' and 'outflow out of the employed segment of the labour market'. The latter is a combination of the outflow to self-employment, unemployment and inactivity. The reasoning behind this lies in administrative delays. From the first mobility analyses based on the Datawarehouse we learned that certain social security institutes supplying data to the Datawarehouse have inherent delays with their registration (Booghmans & Van Gils, 2004).

By way of illustration, we give the example of employees who leave their job to become self-employed. The registration of their self-employment may be delayed, causing them to show up in the statistics as 'inactive' during one quarter and as 'self-employed' only in the following quarter, despite the fact that they actually started their self-employment immediately after leaving their wage-earning job. Earlier analyses of the inflow into self-employment (on a quarterly basis: i.e. between the first and second quarter of 2000) based on the Datawarehouse showed that an unexpectedly high proportion of the self-employed flowed in from inactivity. If the inflow was studied on a yearly basis (for example, between the first quarter of 1999 and the first quarter of 2000), the proportion fell considerably. A significant number of people flowing from another status (employment, unemployment, ...) were consequently inactive for a period of up to three quarters before becoming self-employed. Registering self-employment therefore presumably entails administrative delays. Another reason is the fact that starting self-employment often requires a preparation period spanning a few quarters. The analyses showed that people flowing into unemployment are also often inactive for one or several quarters, according to the statistics. But the problem does not exist with the inflow into employment and it was therefore not mentioned in the relevant section.

A partial solution for the problem is to analyse the outflow on an annual rather than on a quarterly basis. But that poses the opposite problem that someone showing as employed in the first quarter of 1999 and as self-employed in the first quarter of 2000 will be assumed to have a straight transition from employment to self-employment, while he may in fact have been unemployed for a period of two quarters, followed by a decision to become self-employed. For the time being, no fitting solution seems available for the problem of administrative delays, although analyses on an annual basis have already overcome a large part of the problem. We will still analyse the outflow from employment on a quarterly basis, in analogy with the analysis of the inflow, because we do not have the required mobility data on an annual basis at our disposal. The problem amounts to not being able to determine with absolute certainty what the actual situation is of people flowing out of employment in the following quarter. We have therefore combined the outflow to self-employment, to unemployment and inactivity under the heading 'outflow out of the employed segment'. On the basis of the available data, therefore, it is not possible to gain a clear insight into the 'entrepreneurship' of employees.

Of 3,235,900 employees (on the last day of a quarter in 2000), 207,406 (6.4%) no longer worked in that job during the following quarter. A proportion of 4.1% even flowed away from the employed segment of the labour market, while 2.3% changed jobs (and 1.1% both changed jobs and to a different sector).

Table 6.4 Outflow rates (out of a wage-earning job) by activity sector - Belgium, average quarter 2000

STILE sector	Em-ployees (n)	Quarterly outflow from job (n)	To other job (%)	Of which in other sector (%)	Out of employ-ment (%)	Total out-flow from sector (%)	Total outflow from job (%)
1.1	22,330	797	1.4	1.3	2.2	3.4	3.6
1.2	30,811	1,047	1.8	1.3	1.6	3.0	3.4
1.3	36,205	2,509	4.4	2.6	2.5	5.1	6.9
2.1	22,328	4,677	3.7	2.3	17.2	19.5	20.9
2.2	4,003	131	1.4	1.1	1.8	3.0	3.3
2.3	136,074	7,759	2.3	1.5	3.4	4.9	5.7
2.4	156,781	6,448	1.6	1.1	2.5	3.6	4.1
2.5	233,253	8,013	1.5	1.0	1.9	2.9	3.4
2.6	57,640	2,586	2.1	1.6	2.4	4.0	4.5
2.7	26,595	659	0.7	0.6	1.8	2.4	2.5
2.8	179,667	13,306	3.9	1.2	3.5	4.7	7.4
3.1	509,646	45,915	3.7	1.6	5.3	6.9	9.0
3.2	219,968	10,988	2.5	1.0	2.5	3.5	5.0
3.3	128,274	4,693	1.6	0.8	2.0	2.8	3.7
3.4	276,635	39,599	3.0	1.8	11.4	13.1	14.3
4.1	313,199	13,245	1.1	0.7	3.1	3.8	4.2
4.2	10,413	486	2.6	2.3	2.1	4.4	4.7
5.1	321,466	15,978	2.0	0.8	3.0	3.8	5.0
5.2	529,452	22,329	1.4	0.8	2.8	3.6	4.2
5.3	3,141	304	2.0	1.5	7.7	9.2	9.7
Total economy	3,235,914	207,406	2.3	1.1	4.1	5.3	6.4

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

Just as with the analysis of the inflow, we see that in most STILE sectors the outflow is slightly below average (6.4%) and that some sectors sharply exceed the average, namely *Wholesale and retail trade, hotels, restaurants* (STILE 3.1), *Other services* (STILE 3.4), *Construction* (STILE 2.8), *Agriculture, forestry, fishing* (STILE 2.1) and *Computer and related activities* (STILE 1.3). These are precisely the sectors with a higher than average inflow rate. The extremely high outflow rates of 2.1 and 3.4 can be explained by seasonal work (STILE 2.1) and the presence of interim sector NACE 74.5 (STILE 3.4), characterised by a higher proportion of short-term work contracts and consequently very mobile employees.

Overall, the total outflow from a wage-earning job in the *industrial branch of ICT* (3.6%) and in *Telecommunications* (3.4%) lies below the average for all sectors (6.4%), while it is higher in the *Computer and related activities* (6.9%) due to the high proportion of employees changing jobs. The outflow of knowledge and skills is higher

in the *Computer and related activities* than in other sectors. More than half of all job-to-job mobile in the ICT sectors also move to another sector.

Table 6.5 Outflow rates (out of a wage-earning job) in the ICT sector by gender - Belgium, average quarter 2000

STILE sector	Em-ployees (n)	Quarterly outflow from job (n)	To other job (%)	Of which in other sector (%)	Out of employ-ment (%)	Total out-flow from sector (%)	Total outflow from job (%)
15-24 year olds							
1.1	2,606	153	2.7	2.3	3.2	5.5	5.9
1.2	3,133	254	4.1	3.2	4.0	7.2	8.1
1.3	4,793	412	5.4	3.2	3.2	6.4	8.6
Total economy	375,379	59,927	4.9	2.6	11.1	13.7	16.0
25-34 year olds							
1.1	7,254	295	2.2	2.0	1.8	3.8	4.1
1.2	9,807	515	3.1	2.3	2.2	4.4	5.2
1.3	18,618	1,427	5.1	3.0	2.6	5.6	7.7
Total economy	948,186	70,462	3.2	1.7	4.2	5.9	7.4
35-44 year olds							
1.1	6,413	131	0.9	0.7	1.1	1.9	2.0
1.2	8,806	162	1.0	0.7	0.9	1.6	1.8
1.3	9,104	492	3.3	1.9	2.1	4.0	5.4
Total economy	986,896	41,915	1.7	0.8	2.6	3.4	4.2
45-64 year olds							
1.1	6,057	220	0.4	0.4	3.2	3.6	3.6
1.2	9,066	117	0.3	0.2	1.0	1.2	1.3
1.3	3,690	177	2.2	1.4	2.6	4.0	4.8
Total economy	925,453	35,101	0.8	0.3	3.0	3.3	3.8

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

By age, we can immediately see that the total outflow from a job falls as the age increases. The high outflow percentage among youngsters (16.0%) is largely a result of the high outflow from the wage-earning segment (11.1%). It is noteworthy that, in the ICT sectors, the outflow by youngsters lies a great deal below the average for all youngsters. Work experience in the ICT sector seems to give younger people a great advantage in the labour market. Among the other age groups, the outflow is lower in ICT sectors 1.1 and 1.2 (but the difference is not as pronounced as for the youngsters), and higher in STILE 1.3. In the older age groups, the *Computer and related activities* consequently lose a larger than average amount of knowledge.

Table 6.6 Outflow rates (out of a wage-earning job) in the ICT sector by gender - Belgium, average quarter 2000

STILE sector	Employees (n)	Quarterly outflow from job (n)	To other job (%)	Of which in other sector (%)	Out of employment (%)	Total outflow from sector (%)	Total outflow from job (%)
Men							
1.1	14,932	518	1.7	1.5	1.8	3.3	3.5
1.2	21,561	638	1.6	1.2	1.3	2.5	3.0
1.3	26,683	1,835	4.5	2.5	2.4	4.9	6.9
Total economy	1,834,642	109,392	2.3	1.1	3.7	4.8	6.0
Women							
1.1	7,399	279	0.9	0.7	2.9	3.7	3.8
1.2	9,250	409	2.1	1.6	2.3	4.0	4.4
1.3	9,522	674	4.2	2.9	2.9	5.8	7.1
Total economy	1,401,270	98,014	2.2	1.1	4.8	5.9	7.0

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

The differences between men and women are more limited here. Women are slightly more likely than men to flow out from their job (7.0%), particularly out of the wage-earning segment (4.8%). In *Telecommunications* (STILE 1.2) and to a lesser extent in the *industrial branch* (STILE 1.1) of ICT, this general pattern is also visible. But the differences between men and women are smaller in *Computer and related activities* (STILE 1.3).

The outflow to other jobs is on average the same for men and women. However, differences occur between the ICT sectors. In the industrial branch and in *Computer and related activities*, the outflow to other jobs is higher among men, while it is higher among women in *Telecommunications*.

6.1.4 Inflow-outflow: the result

Based on the analysis of the inflow and outflow movements, it became clear that wage earners in some activity sectors tend to be more mobile than those in others. Table 6.7 below gives a general mobility rate on the basis of the total inflow and outflow rates, showing around which activity sectors most mobility takes place.

Of the total database of 3,235,914 employees (in an average quarter in 2000) in Belgium, 225,507 were mobile between two quarters (inflow into or outflow from a wage-earning job). This gives a mobility rate of 13.4%.

Five STILE sectors stand out above the average. Their work force has a high level of mobility into and from wage-earning jobs. The two highest mobility rates are recorded in *Agriculture, forestry and fishing* (STILE 2.1) and *Other services* (STILE 3.4). As stated above, the high mobility rate is due to the prevalence of short-term contracts, for example for seasonal work and interim work. The other three sectors are *Wholesale and retail trade, hotels, restaurants* (STILE 3.1), *Construction* (STILE 2.8) and *Computer and related activities* (STILE 1.3). From the high mobility in the Computer and related activities, we can deduce that the Information Society Knowledge is very mobile: there is a high flow rate of knowledge and skills.

Notably, the mobility is highest among youngsters: 38.3% of 15 to 24 year olds and 15.2% of the 25 to 34 year olds. As stated earlier, the mobility in STILE sectors 1.1 and 1.2 is consistently below average, whereas it is above average in STILE sector 1.3. Remarkably, the mobility rate of the 15 to 24 year olds in STILE sector 1.3 lies below the average (30.0%). The fact that STILE sector 1.3 has an above average mobility is therefore due to the above average mobility of the other age groups, which means that it not only has a high level of knowledge, but also of experience.

By gender, we already established that women have a higher socio-economic mobility than men (i.e. between labour status: employed, unemployed, etc). This also applies to the ICT sector, except for *Computer and related activities* (STILE 1.3) where men and women have the same mobility rate.

Table 6.7 Inflow rate, outflow rate, total mobility rate by sector - Belgium, average quarter 2000

STILE sector	Number of employees (n)	Quarterly inflow rate (%)	Quarterly outflow rate (%)	Total quarterly mobility rate (%)
1.1	22,330	3.9	3.6	7.5
1.2	30,811	4.8	3.4	8.2
1.3	36,205	9.6	6.9	16.5
2.1	22,328	21.3	20.9	42.3
2.2	4,003	2.8	3.3	6.1
2.3	136,074	4.7	5.7	10.4
2.4	156,781	4.0	4.1	8.1
2.5	233,253	3.5	3.4	6.9
2.6	57,640	4.0	4.5	8.5
2.7	26,595	2.1	2.5	4.6
2.8	179,667	7.8	7.4	15.2
3.1	509,646	9.3	9.0	18.3
3.2	219,968	5.4	5.0	10.4
3.3	128,274	3.8	3.7	7.4
3.4	276,635	16.9	14.3	31.2
4.1	313,199	4.6	4.2	8.9
4.2	10,413	5.9	4.7	10.5
5.1	321,466	5.9	5.0	10.8
5.2	529,452	4.8	4.2	9.0
5.3	3,141	7.4	9.7	17.1
Total economy	3,235,914	7.0	6.4	13.4

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

6.2 The European perspective

6.2.1 Overall inflows

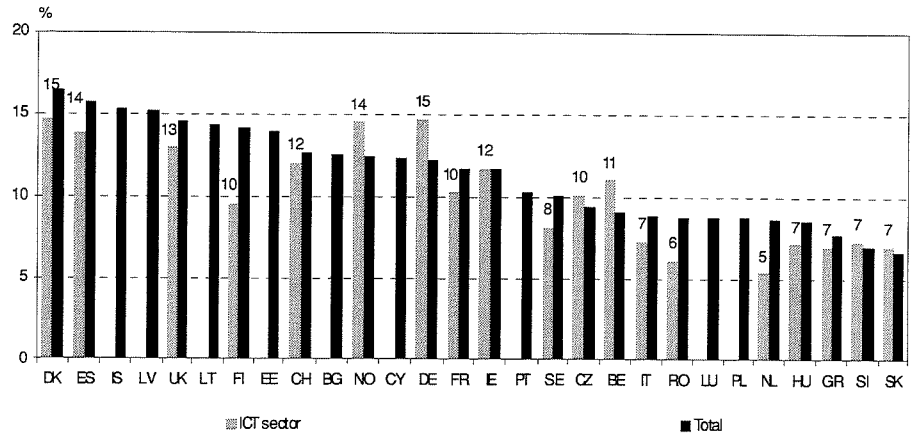
For available countries, Figure 6.1 indicates the proportion of new recruits, or inflows, in 2002 for both the ICT sector and overall. As such, it includes people regardless of their activity status in the previous year (employed, unemployed or inactive) and can also include people that were employed in the ICT sector in the previous year, but

that have changed jobs in the previous 12 months. The highest levels in the ICT sector can be seen in Denmark and Germany, where 15% of all people working in the ICT sector started their new job within the year. Denmark and Germany are closely followed by Spain, Norway (both 14%) and the UK (13%). On the whole though, the proportion of workers that are new recruits tends to be higher in the economy overall than it does in the ICT sector, meaning that there are key sectors pulling up the overall average in comparison to the ICT sector. The only places where this is not the case are Germany, Norway, the Czech Republic and Belgium. In Slovenia and Slovakia, new recruits only just make up a higher proportion of workers in the ICT sector than they do overall and in Ireland, the ratio is identical. In the 12 other countries for which data is available for both the ICT sector and overall, the total economy tends to have a proportionately higher inflow of new recruits than the ICT sector.

In fact, data availability, or lack of, is one of the key messages that can be taken from this figure. This is the especially the case for the ICT sector, with the principal cause being failure to meet the reliability thresholds for LFS data provided by Eurostat. The reason is that there are simply not that many people in each country's sample of individuals that meet the criteria imposed for such an analysis, before even other interesting comparisons could be made such gender or age differences. For example, the criteria for being a new recruit in the ICT sector would be:

- employed in 2002;
- working in the ICT sector;
- have been employed with current employer/as self-employed for up to 12 months.

Figure 6.1 New recruits as a % of employment in the ICT sector and overall - European countries, 2002



Exceptions to the reference year 2002: DE, LU = 2001.
Source: EU LFS, spring data

6.2.2 Net flows - using changes over time as a proxy for overall mobility

More than a 1,1 million jobs have been created in the ICT sector between 1998 and 2002 in the EU-25, a million of those in the EU-15 and over 250,000 in Germany alone. But to give an overview on the changing composition of the ICT sector over time, Table 6.8 shows the breakdown of ICT sector workers according to age in both

1998 and 2002 as well as the annual average growth of these age groups within the ICT sector over the same period.

Table 6.8 ICT sector employment by age in 1998 and 2002 (thousands and % of 25-64 year olds), annual average growth, 1998-2002 - European countries

	1998				2002				AAGR 1998-2002		
	25-64 1,000s	25-34 %	35-44 %	45-64 %	25-64 1,000s	25-34 %	35-44 %	45-64 %	25-34 %	35-44 %	45-64 %
EU-25	5,989	36	32	31	7,095	36	34	30	4.2	5.6	3.2
EU-15	5,568	36	33	31	6,592	36	34	30	3.9	5.8	3.1
BE	150	35	34	31	182	37	34	29	6.8	4.9	3.1
CZ	151	35	26	39	171	38	26	36	4.8	3.6	1.0
DK	109	43	27	30	131	31	36	34	-4.0	11.7	8.1
DE	1,324	35	33	33	1 578	32	38	30	2.9	11.6	3.3
EE	13	:u	:u	:u	16	33u	:u	45u	:u	:u	:u
EL	57	27	35	38	73	36	30	33	13.8	2.5	3.1
ES	294	46	26	29	401	49	30	21	9.8	12.4	0.4
FR	926	32	35	34	1,055	35	33	32	5.8	2.0	2.3
IE	83	51	30	19	107	52	30	19	6.8	6.4	6.3
IT	626	33	36	31	778	38	34	29	9.1	3.8	3.6
CY	4	38u	39u	24u	5	50	34	16u	17.2u	2.1u	-5.6u
LV	14	:u	38u	37u	17	35u	:u	43u	:u	:u	9.6u
LT	36	27	33	40	25	34	38	28	-3.8	-6.4	-17.1
LU	4	38u	39	23u	5	38	32	30u	9.0u	2.0	17.5u
HU	121	38	32	30	176	43	25	33	13.0	3.0	11.9
NL	274	42	34	24	315	35	35	30	-0.8	4.4	8.9
AT	134	41	30	29	165	38	36	26	3.5	10.2	3.1
PL	:	:	:	:	:	:	:	:	:	:	:
PT	66	39	33	27	71	50	23	27	7.9	-7.3	1.2
SI	21	40u	35u	25u	24	46	29u	25u	7.4u	-1.0u	4.0u
SK	61	37	32	31	70	36	33	30	3.2	4.2	3.1
FI	115	39	33	28	125	41	30	30	3.0	-0.3	3.1
SE	195	32	29	40	223	34	31	36	5.2	5.1	0.7
UK	1,211	38	32	30	1,383	34	35	30	0.4	6.2	3.9
IS	4	32	28	40	5	39	26	35	8.5	2.1	0.6
NO	72	32	33	35	85	38	32	30	8.2	3.3	0.5
CH	183	33	30	36	199	33	35	32	1.7	5.6	-1.0
BG	69	25	35	41	72	28	27	45	9.0	-10.4	7.8
RO	165	38	36	26	140	45	28	27	0.4	-10.0	-3.3

Exceptions to the reference year 1998: CY = 1999; BG = 2000.
Exceptions to the reference year 2002: DE, LU = 2001.
Exceptions to the reference period 1998-2002: DE, LU = 1998-2001; CY = 1999-2002; BG = 2000-2002.
:u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data

At first sight, a key result is that far from being a sector where the highest growth has been for the youngest age cohorts (25-34 year olds) it is the 35-44 year olds that have seen the highest growth rates in employment. At the EU-25 level, the number of 35-44 year olds working in the ICT sector has grown by an average of 5.6% per year, compared with 4.2% for 25-34 year olds and 3.2% for 45-64 year olds. These trends are even more marked for the EU-15 aggregate. It is worth underlining that this trend is significantly affected by the weight of Germany, and to a lesser extent the UK, in the ICT sector for Europe. A closer look at the country data reveals that there are in fact more countries where the highest growth in their ICT sector has been for the 25-34 year old population, but the relative size of their economies has less effect on the aggregate results.

A net inflow into the ICT sector in Italy of around 152,000 (778,000 in 2002 compared with 626,000 in 1998) can be estimated to have the following composition. In 1998, 25-34 year olds accounted for 33% of employment in the ICT sector, while 35-44 year olds accounted for 36% and 45-64 year olds 31%. This is equivalent to around 207,000, 226,000 and 194,000 people, respectively. With 25-34 year olds accounting for around 293,000 ICT workers in 2002, It can be estimated they represent 57% of total growth in the ICT sector compared with 24% for 35-44 year olds and 19% for people aged 45-64 (not in table). This gives a fairly clear indication of the demand for as well as supply of young ICT workers in Italy.

Table 6.9 ICT sector employment for the tertiary educated by age in 1998 and 2002 (thousands and % of 25-64 year olds), annual average growth, 1998-2002 - European countries

	1998				2002				AAGR 1998-2002		
	25-64 1,000s	25-34 %	35-44 %	45-64 %	25-64 1,000s	25-34 %	35-44 %	45-64 %	25-34 %	35-44 %	45-64 %
EU-25	1,853	45	32	23	2,451	45	34	22	7.1	8.3	5.8
EU-15	1,769	45	32	22	2,324	45	34	21	6.8	8.4	5.6
BE	57	50	31	19	82	48	32	19	8.2	11.1	10.2
CZ	24	40	28	32	37	42	31	28	12.6	14.3	7.3
DK	32	49	29	22u	43	43	32	26	4.3	10.3	11.3
DE	446	34	38	28	526	32	40	28	5.2	11.5	8.6
EE	6	:u	:u	:u	9	:u	:u	:u	:u	:u	:u
EL	16	31	36	33	26	45	30	25	23.9	6.9	4.4
ES	142	62	21	17	225	57	30	13	9.8	23.4	4.8
FR	290	52	28	20	430	52	29	18	10.4	11.8	8.1
IE	20	68	23	:u	45	65	26	9u	20.4	24.9	:u
IT	88	44	37	18	135	48	35	16	13.7	9.9	8.0
CY	2	58u	35u	:u	3	57	32u	:u	18.8u	16.5u	:u
LV	3	:u	:u	:u	7	:u	:u	:u	:u	:u	:u
LT	16	33	:u	38	14	:u	42	:u	:u	:u	:u
LU	1	42u	:u	:u	2	53u	32u	:u	18.3u	:u	:u
HU	20	34	31	35	33	50	17	32	26.0	-1.4	11.4
NL	83	53	30	18	127	43	35	21	6.1	16.6	16.4
AT	15	47	34	19	33	43	37	19	20.3	25.9	23.3
PL	:	:	:	:	:	:	:	:	:	:	:
PT	11	:u	:u	:u	15	63u	:u	:u	:u	:u	:u
SI	4	41u	35u	:u	5	43u	29u	28u	12.0u	5.8u	:u
SK	10	52	30u	:u	18	55	26	19u	17.9	12.7u	:u
FI	41	43	41	17	63	48	30	22	15.1	3.5	19.3
SE	70	40	36	24	76	45	30	25	4.9	-2.3	2.4
UK	457	46	32	22	496	43	36	22	0.6	6.4	1.6
IS	1	:u	:u	:u	2	:u	:u	:u	:u	:u	:u
NO	28	42	32	26	44	45	35	20	14.7	15.5	4.6
CH	46	40	27	33	66	38	38	24	8.4	19.2	0.4
BG	25	29u	34u	37u	27	37u	23u	40	17.8u	-15.2u	8.8u
RO	31	48	30	23	40	50	36	14	8.0	12.0	-5.4

Exceptions to the reference year 1998: IE = 1997; DE, CY, LU, UK, IS = 1999; BG = 2000.
Exceptions to the reference year 2002: DE, IE, LU = 2001.
Exceptions to the reference period 1998-2002: IE = 1997-2001; DE, LU = 1999-2001; CY, UK, IS = 1999-2002; BG = 2000-2002.
:u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data

It is true that this measurement only calculates the *difference*, or growth, in the composition of the ICT sector according to age, but it can also be interpreted as a net flow, in this case according to age group. To that extent, it misses *all* the incidences

of mobility in the ICT sector. But in the absence of more detailed and more accurate measurements, it may provide a kind of least-worst alternative to measuring the characteristics of ICT employment with the EU LFS.

Table 6.9 provides similar indicators, but this time concentrates on the tertiary educated. Though there has been no overall change in the proportion of tertiary educated workers that are 25-34 in the ICT sector in Europe between 1998 and 2002 (45%), the 35-44 year old age group has increased its share of workers. In fact, they have the highest growth rate of all (8.3% in the EU-25). Comparing the data with Table 6.8, it is interesting to note that the tertiary educated are more in demand in the ICT sector at all ages. For example, annual growth in the number of 45-64 year old tertiary educated ICT workers was 5.8% between 1998 and 2002. This compares with 3.2% when the data is not differentiated for level of education.

At the EU-25 level, there was a net increase of close to 600,000 jobs for the tertiary educated in the ICT sector. People aged 25-34 accounted for over 260,000 of those (44%), whilst around 227 000 more jobs were created for tertiary educated 35-44 year olds in the ICT sector and around 107,000 for 45-64 year olds.

Chapter
7

Job-to-job mobility in the ICT sector

During the analyses of the inflow and outflow movements, we already turned our attention a few times to employed people who change jobs. In this chapter, we will examine this specific group in greater detail.

7.1 The Belgian perspective

Job-to-job mobility is commonly conceived as a change of employer. In the Datawarehouse only data about the individual's legal employer (enterprise) is included and not about the establishment. We measure mobility as a change of the relation between an individual's unique ID-number and his/her employer's unique ID-number.

These tables only contain people who were employed during the entire period, from the second quarter of 1999 to the second quarter of 2000. Accordingly, people who were unemployed between two jobs are not considered as job-to-job mobile and do not feature. This explains why the number of employees distributed by sector in these tables deviates from figures given in previous analyses.

7.1.1 Differences in job-to-job mobility according to sector

The job-to-job mobility rate reflects the proportion of employees who are working for a different employer one year later. Globally speaking, 7.2% of all employees in Belgium moved jobs between 1999 and 2000.

In general, employees in the commercial service sectors (for example *Hotels and restaurants*, *wholesale and retail*) experience greater job-to-job mobility and those in the non-profit making sectors (for example, *the Public sector*) are less mobile. In the ICT sector, the proportion of job-to-job mobile employees is significantly higher than average: 8.9% of employees in the ICT sector worked for a different employer/company in 2000 compared to 1999. Also within the ICT sector, notable differences come to the fore such as the commercial provision of services (*Consultancy*, NACE 72.1 and 72.2), which is much more mobile than, for example, the industrial branch of ICT. Within the *Hardware* and *Software consultancy*, respectively 17% and 15% of employees are job-to-job mobile, which makes consultants one of the most job mobile employees. But other employees within NACE sector 72 also have a higher than average job-to-job mobility.

We cannot draw conclusions on whether their job-to-job mobility is voluntary or not. Some people are forced to change jobs following redundancy or bankruptcy. Others change jobs at their own initiative. Analyses on the basis of the Belgian LFS have demonstrated that the proportion of involuntary job-to-job mobility is significantly

lower in the non-profit making sector than in the commercial service sector. These non-profit making sectors are, among other things, less sensitive to cyclical fluctuations and consequently less liable to bankruptcies and redundancies, forcing fewer people to look for other jobs. From the perspective of the mobility of know-how, this distinction is nevertheless not particularly relevant. The result is the same: the employee with their knowledge and skills is gone.

It is worth underlining that this type of information is not requested as part of the EU LFS list of variables. In the EU LFS, the reason for leaving the last job or business is only asked to people that are not working in the reference of the survey (and have not been for up to a maximum of eight years). In the Belgian LFS, the question is in fact posed as a dual question, asking for the information described above not only from people that are currently not working, but also from those that have changed job in the last 12 months. This is a key piece of qualitative information useful for research into the causes of job-mobility and one that is lacking in the EU LFS.

Table 7.1 Job-to-job mobility rate of employees (15-64 years old) in the ICT sector - Belgium, 2nd quarter 1999-2000

NACE/sector	Description	Total number of employees 2nd quarter 1999 (n)	Job mobility rate (%)
30.0	Manufacture of office machinery and computers	432	5.1
32.1	Manufacture of electronic valves and tubes and other electronic components	7,194	3.7
32.2	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy	8,767	4.6
32.3	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods	3,131	5.9
33.1	*Manufacture of medical and surgical equipment and orthopaedic appliances*	*2,478*	*7.9*
33.2	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment	1,207	4.9
33.3	Manufacture of industrial process control equipment	2,047	8.5
33.4	*Manufacture of optical instruments, photographic equipment*	*532*	*8.6*
33.5	*Manufacture of watches and clocks*	*343*	*9.0*
64.1	*Post and courier activities*	*46,483*	*2.5*
64.2	Telecommunications	26,429	5.7
72.1	Hardware consultancy	11,008	17.0
72.2	Software consultancy and supply	12,600	15.0
72.3	Data processing	1,815	10.6
72.4	Data base activities	818	12.7
72.5	Maintenance and repair of office, accounting and computing machinery	1,432	12.6
72.6	Other computer related activities	81	29.6
ICT 2 digits		*126,797*	*6.6*
ICT 3 digits		**76,961**	**8.9**
STILE 1.1	Office accounting and computing machinery and electronic equipment	22,778	4.9
STILE 1.2	Telecommunications	26,429	5.7
STILE 1.3	Computer and related activities	27,754	15.3
STILE 2.1	Agriculture, forestry, fishing	14,530	13.3
STILE 2.2	Mining, quarrying	3,642	5.7

Table 7.1 Job-to-job mobility rate of employees (15-64 years old) in the ICT sector - Belgium, 2nd quarter 1999-2000. Continued

NACE/sector	Description	Total number of employees 2nd quarter 1999 (n)	Job mobility rate (%)
STILE 2.3	Consumer goods	124,219	7.5
STILE 2.4	Wood, pulp and paper, printing, oil refining, chemical industry, rubber, plastics	138,348	5.4
STILE 2.5	Metals, machinery (not ICT)	207,487	5.0
STILE 2.6	Other manufacturing	52,691	7.1
STILE 2.7	Energy and water	25,299	2.1
STILE 2.8	Construction	153,921	12.4
STILE 3.1	Wholesale and retail trade, hotels, restaurants	420,665	11.8
STILE 3.2	Transport, storage, post, communications	201,452	7.3
STILE 3.3	Financial intermediation	115,145	5.9
STILE 3.4	Other services	194,556	12.4
STILE 4.1	Universities, educational institutions	278,445	3.4
STILE 4.2	Research institutes	9,027	9.7
STILE 5.1	Health activities	275,292	5.5
STILE 5.2	Other community services	467,909	3.8
STILE 5.3	Extraterritorial organisations	2,283	6.3
Total economy		2,778,338	7.2

Note: Non-ICT sectors which are included in the ICT definition based on two digit NACE codes, but excluded from the definition based on the three digit level, are in italics.
Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

7.1.2 Evolution in ICT job-to-job mobility

The proportion of employees changing jobs varies over time. On the basis of the Labour Force Survey, we can calculate the job-to-job mobility rate from 1993 to 2002.

Mobility is influenced by the economic environment. In the Scandinavian countries, where a lot of research has already been carried out into mobility, it was established that job-to-job mobility seems to keep pace with the economic cycle: the better the economy (measured on the basis of unemployment levels and the growth rate of the Gross National Product), the higher the job-to-job mobility (Graversen et al., 2001).

As far as Belgium is concerned, there seems to be a slightly positive correlation between job-to-job mobility and the economic cycle. If we use the ILO's figure for the level of unemployment as an indicator for the economic climate (high unemployment pointing towards an unfavourable climate), we can assume that the economic decline culminated in the years 1994 to 1996. From 1997, unemployment started to recede somewhat, with a steeper decline in 2000 and 2001 and a new increase in 2002. It should be noted that the studied period (1993-2002 with an interruption between 1998 and 1999) is too short to show up clear trends over time. This analysis should consequently be interpreted as a tentative exercise.

Table 7.2 Job-to-job mobility rate of employed people between 15 and 64 years old in % - Belgium, 1993-2002

NACE/sector	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
30, 32, 33	:	:	:	:	:	:	7.4	6.4	5.2	5.8
64	:	:	:	:	:	:	4.9	5.5	5.0	5.9
72	:	:	:	:	:	:	14.2	15.2	10.8	13.1
ICT 2 digits	*2.1*	*2.0*	*3.3*	*3.2*	*2.5*	*2.6*	*7.3*	*8.2*	*6.6*	*8.1*
Total economy	3.4	3.1	3.5	3.5	3.3	3.6	6.7	7.7	7.8	6.6

Break in series between 1998 and 1999.
Source: NIS LFS (Processing Steunpunt WAV)

We see that the job-to-job mobility rate between 1993 and 1998 fluctuated between 3.1% and 3.6%. It is hard to assess whether this level is low or normal, considering we do not yet have access to sufficiently long time sequences. In view of the methodological change in the LFS between 1998 and 1999, we do not know what happened to the job-to-job mobility in that period. In the period from 1999 to 2001, when the economy started to grow, job-to-job mobility increased. In 2002, when the economy slowed down, job-to-job mobility receded to 6.6%. We consequently find a slight variation in the job-to-job mobility rate, but it remains fairly level on the whole. In the Scandinavian countries, the job-to-job mobility rate undergoes much stronger fluctuations (Graversen et al., 2001).

In the ICT sector, we find that job-to-job mobility fluctuates even more than average, making the correlation with the economic cycle even less evident. Whereas the job-to-job mobility rate on average remained constant between 2000 and 2001, it showed a strong decline in ICT. In 2002, it rose again sharply in ICT, compared to a pronounced decline in the average rate. These strong fluctuations are manifesting themselves particularly in NACE sector 72: between 2000 and 2001 a decrease from 15% to 11% and in 2002 an increase to 13%. On the whole, no firm conclusions can be drawn from the long-term analysis of job-to-job mobility on the basis of the Belgian LFS.

7.1.3 Job-to-job mobility by gender and age

The differences between men and women with relation to job-to-job mobility are fairly limited. Women are marginally less job mobile than men. The differences also remain limited within the ICT sector: 9.3% of male employees are job-to-job mobile compared to 8.1% of women. Only within *Telecommunications* (NACE 64.2) is the proportion reversed with women slightly more job-to-job mobile than their male colleagues.

Table 7.3 Job-to-job mobility rate of employees in the ICT sector by gender and age - Belgium, 2nd quarter 1999-2000

NACE/sector	Total number of employees 2nd quarter 1999 (n)	Total (%)	Men (%)	Women (%)	15-24 years (%)	25-34 years (%)	35-44 years (%)	45-64 years (%)
30.0	432	5.1	4.5	6.0	8.6	5.3	4.5	4.2
32.1	7,194	3.7	4.6	2.1	8.0	5.5	2.2	1.2
32.2	8,767	4.6	5.0	3.3	13.7	8.9	2.6	1.2
32.3	3,131	5.9	8.3	2.4	10.3	9.0	3.3	2.3
33.1	*2,478*	*7.9*	*9.3*	*5.8*	*18.9*	*8.7*	*4.8*	*3.6*
33.2	1,207	4.9	6.3	2.2	11.3	6.1	2.4	4.0
33.3	2,047	8.5	8.8	6.8	16.9	10.4	6.4	3.3
33.4	*532*	*8.6*	*8.2*	*9.1*	*19.0*	*12.2*	*5.1*	*1.1*
33.5	*343*	*9.0*	*9.9*	*6.6*	*10.3*	*13.0*	*5.2*	*2.1*
64.1	*46,483*	*2.5*	*2.4*	*2.6*	*12.9*	*5.8*	*1.5*	*0.5*
64.2	26,429	5.7	5.2	7.1	17.9	10.9	2.7	0.9
72.1	11,008	17.0	17.7	15.0	22.2	18.7	13.7	8.8
72.2	12,600	15.0	15.1	14.5	19.0	17.1	11.6	6.9
72.3	1,815	10.6	11.7	8.2	24.2	14.0	9.7	2.5
72.4	818	12.7	11.6	14.3	14.4	15.8	5.6	1.9
72.5	1,432	12.6	13.3	9.8	15.9	15.8	7.5	4.7
72.6	81	29.6	32.7	23.1	57.1	27.3	23.5	50.0
ICT 2 digits	*126,797*	*6.6*	*6.8*	*5.9*	*16.2*	*11.3*	*4.1*	*1.3*
ICT 3 digits	**76,961**	**8.9**	**9.3**	**8.1**	**16.9**	**13.3**	**5.6**	**2.1**
STILE 1.1	22,778	4.9	5.8	2.8	11.0	7.7	2.9	1.6
STILE 1.2	26,429	5.7	5.2	7.1	17.9	10.9	2.7	0.9
STILE 1.3	27,754	15.3	15.8	14.0	20.1	17.6	11.9	6.8
STILE 2.1	14,530	13.3	14.4	10.2	20.2	14.5	11.0	6.3
STILE 2.2	3,642	5.7	5.4	8.2	14.4	8.9	4.9	2.3
STILE 2.3	124,219	7.5	7.9	6.9	15.9	9.6	5.7	2.8
STILE 2.4	138,348	5.4	5.2	6.1	12.2	7.7	4.1	1.8
STILE 2.5	207,487	5.0	5.0	4.3	12.8	7.3	3.4	1.5
STILE 2.6	52,691	7.1	7.1	7.1	14.6	9.5	6.0	3.4
STILE 2.7	25,299	2.1	1.5	5.4	26.6	3.4	0.5	0.2
STILE 2.8	153,921	12.4	12.6	8.6	20.1	15.2	10.7	6.0
STILE 3.1	420,665	11.8	12.3	11.1	22.7	13.7	8.5	5.1
STILE 3.2	201,452	7.3	7.3	7.3	16.3	12.2	5.9	3.4
STILE 3.3	115,145	5.9	5.3	6.6	16.5	10.4	4.5	1.7
STILE 3.4	194,556	12.4	11.9	13.0	16.6	15.4	10.2	6.8
STILE 4.1	278,445	3.4	3.6	3.4	13.8	6.5	2.9	1.4
STILE 4.2	9,027	9.7	9.4	10.2	15.6	13.6	6.8	2.8
STILE 5.1	275,292	5.5	6.2	5.3	14.3	7.8	3.7	2.2
STILE 5.2	467,909	3.8	3.2	4.5	14.9	6.6	2.5	1.3
STILE 5.3	2,283	6.3	4.4	7.6	17.8	12.1	4.4	1.9
Total economy	2,778,338	7.2	7.4	6.8	17.4	10.4	5.2	2.7

Note: Non-ICT sectors which are included in the ICT definition based on two digit NACE codes, but excluded from the definition based on the three digit level, are in italics.
Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

Job-to-job mobility is strongly age-related (Table 7.3). Youngsters, in particular, often change jobs. As age increases, job-to-job mobility declines. The turbulent period when youngsters start their career is not surprising: young people are still on the look-out for the ideal job and are furthermore often employed on a temporary contract. The ICT sector does not differ in this respect: of the 15 to 24 year olds, approximately 17% are job-to-job mobile; with the 25 to 34 year olds, this is still 13.3%

and it then strongly decreases in the two higher age groups. The proportion of job-to-job mobile employees is particularly low among the 45 and above age group. With the subsectors of *Computer and related activities* (NACE 72) having high job mobility, this is especially the case for youngsters between 15 and 34, and more specifically in *Consultancy* and *Data processing*. Just as with the previous analyses, we can conclude that the mobility of knowledge in the ICT sector is high in comparison with other sectors.

The Datawarehouse does not contain any data on employees' educational attainment. That data is contained in the LFS, but the information on job-to-job mobility divided up by sector and educational attainment is unreliable in view of the small values. What we can conclude is that, on the whole, employees educated at the lower secondary level are less mobile than medium qualified and highly qualified employees. This is unlikely to be different in the ICT sector.

7.2 The European perspective

Figure 7.1 shows the level of job-to-job mobility in the ICT sector in 2002 and compares it to each economy overall. It is worth underlining that although the type of mobility measured is *observed* job-to-job mobility, ICT sector mobility includes all people that have moved into the ICT sector from another job. In other words, it does not discriminate as to whether people were working in the ICT or another sector in the previous year, only that they were working and that they have changed employer.

Though data availability is better when mobility is measured for the total economy, when the ICT sector is differentiated, data is available is for just seventeen countries. This can be due to an absence of the necessary variables to calculate mobility (i.e. working status in the previous year or length of time with the current employer) or that the sample becomes too small to meet each country's reliability requirements.

On the basis of the countries for which data is available for both the ICT sector and overall, there is no clear trend towards either group. Mobility is higher in the ICT sector than overall in seven countries, higher overall than in the ICT sector in another seven and more or less even in the remaining three. As a result, it is difficult to indicate whether the ICT sector is more dynamic than the average level.

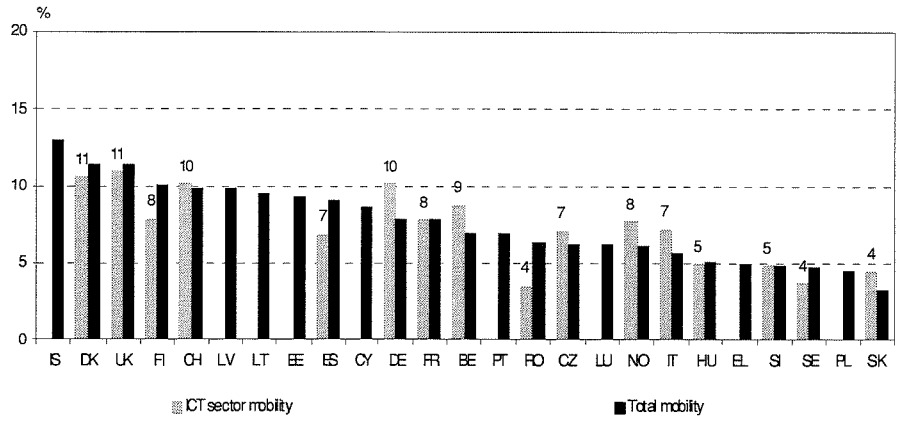
The countries with the highest levels of job-to-job mobility in the ICT sector are Denmark and the UK, where 11% of people working in the ICT sector in 2002 had changed employer in the last year. At the other end of the scale in countries like Sweden, Romania and Slovakia, just 4% of people employed in the ICT sector in 2002 had come from another job in the previous year.

One of the first things to notice when looking at mobility in the ICT sector by gender (Table 7.4) is that the availability of the data decreases significantly, both in comparison with overall mobility and when compared to ICT mobility which is not differentiated for gender. In 2002, data for more than ten countries has had to be suppressed in order to conform to the publication guidelines drawn up by the countries. Furthermore, in some of the other smaller countries, the data should be treated with caution. In fact other than the larger countries Germany, Spain, France Italy and the UK, only the Czech Republic has fewer problems with data breaching the reliability limits. Total mobility is not affected to the same extent. Here the question does not concern meeting the reliability thresholds for the data so much as whether the necessary variables to calculate mobility are reported i.e. Ireland, Austria.

This data availability for the ICT sector, without even taking into consideration the values for which caution should be exercised, serves to negate one of the principal

advantages of the EU LFS: that it is able to provide reasonably harmonised data for a large number of countries for international comparison.

Figure 7.1 Job-to-job mobility in the ICT sector and overall - European countries, 2002



Exceptions to the reference year 2002: DE, LU = 2001.
Source: EU LFS, spring data

Table 7.4 Job-to-job mobility by gender in the ICT sector and overall, 1998, 2000 and 2002

	ICT sector						Total					
	Women			Men			Women			Men		
	1998	2000	2002	1998	2000	2002	1998	2000	2002	1998	2000	2002
BE	11.4u	11.7	8.8u	10.3	11.5	8.6	6.6	7.3	6.6	6.8	7.3	7.0
CZ	5.3	5.2	5.9	8.0	6.0	8.1	6.8	4.5	6.4	7.7	5.4	6.2
DK	:u	12.8u	:u	11.7	11.5	12.1	11.3	12.2	10.4	11.4	12.5	12.4
DE	6.6	9.5	:	7.1	9.4	:	6.2	7.6	:	6.7	7.3	:
EE	:u	:u	:u	:u	:u	:	9.4	8.5	7.5	13.5	11.4	11.1
GR	:u	:u	:u	:u	:u	:u	4.5	4.6	5.0	4.4	4.4	4.9
ES	15.9	8.8	5.2	12.1	7.5	7.5	15.8	8.4	9.3	15.3	9.0	8.9
FR	5.7	6.4	6.4	6.3	7.2	8.5	5.4	6.3	7.4	6.7	8.0	8.2
IE	:	:	:	:	:	:	:	:	:	:	:	:
IT	4.7	4.9	:	3.8	5.5	:	4.6	5.5	:	4.2	5.2	:
CY	:	:u	:	:	:u	:u	:	10.7	7.5	:	9.3	9.4
LV	:	:	:u	:	:	:u	:	:	8.9	:	:	10.8
LT	:	:	:u	:	:	:u	:	:	7.0	:	:	12.0
LU	:u	:u	:	:u	:u	:	4.8	6.4	:	4.1	6.2	:
HU	5.7u	5.5u	6.7	9.1	6.3	3.4u	5.5	4.7	4.6	7.9	5.6	5.6
NL	9.9u	:	:	11.5	:	:	8.6	:	:	7.7	:	:
AT	:	:	:	:	:	:	:	:	:	:	:	:
PL	:	:	:	:	:	:	3.3	:	3.6	6.1	:	5.3
PT	:u	:u	:u	:u	:u	:u	7.6	7.3	5.6	8.5	8.3	7.8
SI	:	:u	:u	:	:u	:u	:	5.1	4.9	:	6.4	4.8
SK	:	:	:u	:	:	:u	:	:	2.5	:	:	3.9
FI	12.7	8.7u	8.7u	6.9u	10.5	7.4	9.9	9.8	10.3	8.7	10.7	9.8
SE	9.9	8.7	:u	11.2	13.7	:u	5.6	6.6	4.7	6.9	9.2	4.8
UK	15.9	14.4	10.2	13.9	14.4	11.2	11.1	10.9	11.4	11.5	11.4	11.5
IS	:u	:u	:u	:u	:u	:u	13.4	13.0	13.0	13.5	15.2	13.1
NO	:u	:u	:u	19.4	11.8	:u	8.6	6.6	6.2	10.3	7.3	6.1
CH	6.8u	10.4u	12.6u	8.8	10.7	8.9	9.3	9.1	11.3	8.7	9.4	8.8
BG	:	:	:	:	:	:	:	:	:	:	:	:
RO	:	:	:u	:	:	:u	:	:	4.8	:	:	7.7

Exceptions to the reference year 2002: DE, LU = 2001.
: = not available; :u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data

Chapter
8

Sectoral flows in ICT

In Chapter 6 we analysed the inflow and outflow at job level (i.e. from unemployed to employed) showing around which activity sectors most of this type of mobility takes place. In this chapter, first, we analyse the inflow into ICT and outflow from ICT at the sectoral level. In calculating the net result we thus obtain a picture of the sector's appeal. Second, we try to formulate an answer to the question on where all the job mobile people go to by looking at the flows between sectors.

8.1 The Belgian perspective

8.1.1 Net flows

When we offset the inflow and outflow, we also obtain a picture of the sector's appeal. For that purpose, we look at the inflow and outflow at sectoral level, not at job level. It will show us how many people flow into and from the activity sector on a quarterly basis.

The figures clearly show that only a few sectors come out with a strongly positive balance on a quarterly basis in 2000: particularly *Computer and related activities* (STILE 1.3), *Telecommunications* (STILE 1.2), *Other services* (STILE 3.4) and to a lesser degree the *Research institutes* (STILE 4.2) welcome more new employees than they see off. A few other sectors have a narrowly positive balance. The largest losers are a number of industrial sectors, such as *Consumer goods* (STILE 2.3) and *Other manufacturing* (STILE 2.6). Overall, the *industrial branch of the ICT sector* manages to achieve a positive net flow.

Mobility is highest among young people. It is not surprising that, particularly of these youngsters, more people flow into wage-earning jobs than flow out of them while the reverse is true for the highest age group. This is logical, since after completing their education, youngsters are in the entry phase in the labour market compared to older people being in their exit phase through retirement. The ICT sectors are no different. This means that they are the recipients of much 'textbook knowledge', but that they also lose a lot of experience and know-how.

Fewer differences exist between men and women. In *Telecommunications* (STILE 1.2), the net flow is more positive for women than for men and in *Computer and related activities* (STILE 1.3) it is more positive for men.

Table 8.1 Inflow, outflow and growth rate by activity sector - Belgium, average quarter 2000

STILE sector	Number of employees (n)	Quarterly inflow into sector (n)	Quarterly out-flow from sector (n)	Net flow (n)	Quarterly growth rate (%)
1.1	22,330	841	761	80	0.4
1.2	30,811	1,352	911	440	1.4
1.3	36,205	2,815	1,853	963	2.7
2.1	22,328	4,432	4,352	80	0.4
2.2	4,003	100	119	-19	-0.5
2.3	136,074	5,362	6,706	-1,344	-1.0
2.4	156,781	5,541	5,700	-159	-0.1
2.5	233,253	6,941	6,823	118	0.1
2.6	57,640	2,015	2,290	-275	-0.5
2.7	26,595	546	642	-96	-0.4
2.8	179,667	9,204	8,431	774	0.4
3.1	509,646	36,472	34,954	1,518	0.3
3.2	219,968	8,659	7,660	999	0.5
3.3	128,274	3,710	3,569	141	0.1
3.4	276,635	43,413	36,277	7,137	2.6
4.1	313,199	13,170	11,879	1,291	0.4
4.2	10,413	583	457	126	1.2
5.1	321,466	14,994	12,080	2,915	0.9
5.2	529,452	22,262	19,230	3,032	0.6
5.3	3,141	219	290	-72	-2.3
Total economy	3,235,914	189,021	170,920	18,101	0.6

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

We can also focus on the inflow to and the outflow from other paid work, which means we only look at job-to-job mobility.

Striking is that the enterprises in the ICT sectors and to a lesser extent in *Construction* (STILE 2.8) and *Transport, storage, post, communication* (STILE 3.2) are the only ones to sign up significantly more employees from other enterprises than they lose to them. Here, too, the enterprises in the industrial sectors are the ones that most often show a negative balance. Somewhat remarkable is that in *Wholesale and retail trade, hotels, restaurants* (STILE 3.1) the enterprises let more people go to other enterprises than it receives in return. We nevertheless noticed that the general inflow into this STILE sector is greater than the outflow. This means that the enterprises in this sector have a large inflow from the inactive segment and from unemployment.

The positive result in the ICT sectors is greatest among the 15 to 24 year olds and it decreases as age goes up. Men and women hardly differ in this respect.

Table 8.2 Inflow to and outflow from another job and growth rate by sector - Belgium, average quarter 2000

STILE sector	Number of employees (n)	Quarterly inflow from other sector (n)	Quarterly outflow to other sector (n)	Net flow (n)	Quarterly growth rate (%)
1.1	22,330	339	279	60	0.3
1.2	30,811	664	408	257	0.8
1.3	36,205	1,309	931	377	1.0
2.1	22,328	327	506	-180	-0.8
2.2	4,003	37	45	-8	-0.2
2.3	136,074	1,489	2,039	-550	-0.4
2.4	156,781	1,812	1,784	28	0.0
2.5	233,253	2,273	2,302	-29	0.0
2.6	57,640	845	902	-58	-0.1
2.7	26,595	172	169	3	0.0
2.8	179,667	2,522	2,085	437	0.2
3.1	509,646	6,474	7,916	-1,443	-0.3
3.2	219,968	2,724	2,240	484	0.2
3.3	128,274	1,109	972	137	0.1
3.4	276,635	4,877	4,860	17	0.0
4.1	313,199	2,422	2,172	250	0.1
4.2	10,413	231	243	-12	-0.1
5.1	321,466	2,470	2,424	46	0.0
5.2	529,452	4,547	4,177	371	0.1
5.3	3,141	40	48	-9	-0.3
Total economy	3,235,914	36,928	36,928	0	0.0

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

8.1.2 Flows between sectors

An interesting question is where all those job changing employees with their knowledge and skills go to. Do they remain within the same sector or do they move to a related rather than completely different sector. Inversely, we can also ask where all the 'new' employees in a sector come from. In order to find an answer to these questions, we look at all the employees who moved to a different employer[16] between two quarters in 2000 and we examine between which sectors the movement took place.[17]

Overall in Belgium, 293,700 employees moved to a different employer between two quarters over the specified period.[18] Of those, 50% remained employed within their own STILE sector. The proportion of 'stayers' is higher in the commercial and non-commercial service sectors (STILE sectors 3.1 to 3.4 and 5.1 to 5.2) and lower in the industrial sectors, with the exception of the construction sector (2.1 to 2.7) (Ta-

16 Sum of the people who were job-to-job mobile between the fourth quarter of 1999 and the first quarter of 2000; between the first and second quarter of 2000; between the second and third quarter of 2000; between the third and fourth quarter of 2000; each time the data refer to the last day of the quarter.

17 Only the inflow and outflow from other sectors are considered, not from other labour market segments like unemployment, for instance.

18 Employees who changed jobs twice (or more) during the year are counted twice (or more), except if the changes took place within one quarter.

ble 8.3). An important observation is that the proportion of 'stayers' in the ICT sectors remains far below the average. Employees in ICT who move to a different employer leave their own (STILE) sector more often than average.

The same picture can be drawn on the basis of the 'inflow': which sectors are new employees flowing in from? Of all employees who changed employer, 50% came from within the same STILE sector. Again, the service sectors stand out (STILE 3.1 to 3.4 and 5.1 and 5.2) with an above average proportion of 'stayers' whereas the ICT sector has a lower than average proportion.

In the cases of the construction and health sectors, intrasectoral mobility is high (70.0% and 61.7% of people that changed job between one quarter and the next stayed within the same sector). We can *suppose* that this is mainly due to the fact that both sets of workers will have very specific, though very different, skills. In the ICT and other sectors, however, intrasectoral mobility is lower or, in other words, the outflows are higher. What we don't know, and what we can't even guess at, is the reason for this lower level of intrasectoral mobility. It could just as easily be evidence of greater transferability of skills as an indication of the attractiveness of the sector in terms of wage levels, hours worked or type of contract provided. That said our judgement on the construction and health sectors are mere suppositions, and the DWH can only provide quantitative information.

The *industrial branch of the ICT sector* (STILE sector 1.1 or NACE sectors 30, 32, 33.2 and 33.3) has an annual job-to-job mobility rate of 4.9%, which is rather limited. Of all the employees in the ICT sector who changed employer, an average of only 11% remains in the sector. Approximately 8% moved to the *Telecommunications sector (STILE 1.2)* and 12% to *Computer and related activities* (STILE 1.3), primarily to *Software consultancy* (NACE 72.2) and *Hardware consultancy* (NACE 72.1). But the majority leave the ICT sector. The main destinations are firstly the *wholesale and retail trade* and the *hotel and catering* industry (STILE 3.1), particularly *Wholesale of machinery, equipment and supplies* (NACE 51.6); secondly *Other commercial service sectors* (STILE 3.4), more in particular *Business and management consultancy activities* (NACE 74.1) and *Architectural and engineering activities and related technical consultancy* (NACE 74.2); and lastly the *Metal sector* (STILE 2.5), where particularly the *Manufacture of machinery and equipment* (NACE 29) and the *Manufacture of electrical machinery and apparatus* (NACE 31) are at the receiving end of a significant proportion of the job-to-job mobile.

As far as the direction of the inflow is concerned, we note that the main 'recipients' are also the main 'suppliers' of employees: *Wholesale and retail trade* (mainly NACE 51.6), *Other commercial services* (mainly NACE 74.1 and 74.2) and the *Metal sector* (particularly NACE 28, 29 and 31). This indicates that the industrial ICT sectors give and take to and from certain other sectors. The balance is slightly positive: they 'receive' slightly more employees from the aforementioned sectors than they 'supplied' to them in 2000.

Table 8.3 Outflow from STILE sectors to sector of destination in % - Belgium, average 2000

Quarter t		Quarter t+1																				
		1.1	1.2	1.3	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	3.1	3.2	3.3	3.4	4.1	4.2	5.1	5.2	5.3	Unknown	Total
1.1	Office accounting and computing machinery and electronic equipment	**11.4**	7.9	12.0	0.0	0.0	2.5	4.6	13.7	1.0	0.2	4.8	15.7	2.1	1.4	13.8	2.9	0.6	2.1	3.1	0.0	0.0	100.0
1.2	Telecommunications	1.5	**25.0**	13.8	0.0	0.0	0.7	2.1	1.3	0.2	0.3	1.5	17.8	3.1	4.3	18.9	1.5	0.2	1.4	6.0	0.2	0.0	100.0
1.3	Computer and related activities	1.8	5.7	**41.3**	0.1	0.0	1.1	2.4	2.1	0.4	0.3	0.9	16.5	1.9	4.6	13.6	2.5	0.4	1.1	3.3	0.1	0.0	100.0
2.1	Agriculture, forestry, fishing	0.1	0.1	0.2	**39.1**	0.2	3.5	2.0	4.1	1.5	0.1	11.2	13.1	7.4	0.3	5.4	1.3	0.5	2.9	7.0	0.0	0.2	100.0
2.2	Mining, quarrying	0.0	0.0	1.3	2.2	**21.1**	1.8	2.2	5.3	5.3	1.8	14.9	13.6	7.0	3.1	10.1	1.3	0.0	1.3	7.5	0.0	0.4	100.0
2.3	Consumer goods	0.7	0.3	0.9	0.8	0.0	**34.1**	5.4	6.2	2.2	0.2	5.1	21.9	5.5	1.1	6.9	1.4	0.2	3.0	4.1	0.0	0.1	100.0
2.4	Wood, pulp and paper, printing, oil refining, chemical industry, rubber, plastics	0.8	0.9	2.5	0.5	0.1	4.2	**29.5**	7.6	2.5	0.4	6.0	17.4	4.4	1.3	12.2	1.7	0.7	2.2	4.9	0.0	0.0	100.0
2.5	Metals, machinery (not ICT)	1.7	0.5	1.4	0.6	0.1	2.7	5.4	**34.1**	3.3	0.5	12.8	15.1	6.1	0.9	8.5	1.2	0.2	1.3	3.5	0.0	0.0	100.0
2.6	Other manufacturing	0.6	0.3	0.5	0.7	0.4	3.7	5.7	9.8	**24.7**	0.3	17.2	15.3	7.6	0.6	5.7	0.9	0.1	1.4	4.3	0.0	0.0	100.0
2.7	Energy and water	0.9	4.3	1.8	0.5	0.0	1.9	4.2	9.6	1.3	**8.9**	6.6	10.0	6.3	5.0	17.7	2.8	0.4	5.1	12.6	0.0	0.0	100.0
2.8	Construction	0.2	0.2	0.2	0.6	0.1	1.2	1.7	5.4	2.2	0.3	**70.0**	6.5	3.7	0.3	3.7	0.5	0.0	0.8	2.4	0.0	0.0	100.0
3.1	Wholesale and retail trade, hotels, restaurants	0.4	0.9	2.0	0.4	0.0	3.1	2.6	3.1	1.0	0.2	3.2	**58.1**	5.0	1.5	8.0	1.9	0.1	3.1	5.2	0.0	0.1	100.0
3.2	Transport, storage, post, communications	0.2	0.5	0.8	0.6	0.0	1.6	1.7	2.9	1.4	0.1	4.6	11.4	**59.8**	1.3	6.6	0.9	0.0	1.0	4.4	0.0	0.1	100.0
3.3	Financial intermediation	0.2	1.8	4.8	0.2	0.0	0.9	1.4	1.4	0.3	0.2	0.8	8.1	2.1	**53.6**	14.0	2.3	0.1	1.6	5.9	0.0	0.0	100.0
3.4	Other services	0.7	2.0	3.9	0.4	0.0	2.5	3.9	3.5	0.9	0.4	3.5	16.4	4.2	3.6	**40.6**	2.3	0.3	3.3	7.4	0.1	0.1	100.0
4.1	Universities, educational institutions	0.4	0.4	2.0	0.3	0.0	1.0	1.8	0.8	0.3	0.1	0.8	6.8	1.6	1.7	6.2	**38.6**	2.1	9.0	25.3	0.1	0.8	100.0
4.2	Research institutes	1.7	1.3	2.9	0.7	0.0	1.8	8.6	1.7	0.5	0.2	0.9	8.0	0.9	1.2	11.8	25.2	**10.8**	6.5	14.6	0.1	0.6	100.0
5.1	Health activities	0.1	0.1	0.4	0.2	0.0	0.9	0.8	0.7	0.2	0.1	0.9	6.8	1.2	0.5	4.1	7.2	0.4	**61.7**	12.1	0.0	1.7	100.0
5.2	Other community services	0.2	0.6	1.2	0.4	0.0	1.3	1.5	1.5	0.6	0.3	2.0	10.6	3.7	1.6	7.6	13.2	0.4	9.6	**42.6**	0.1	0.9	100.0
5.3	Extraterritorial organisations	0.4	1.2	5.6	0.0	0.0	0.0	0.8	1.6	0.0	0.0	0.0	9.2	3.6	5.2	26.1	4.8	0.0	1.2	17.7	**22.5**	0.0	100.0
	Unknown	0.0	0.2	0.2	0.2	0.1	1.5	1.3	0.6	0.1	0.2	1.4	8.5	2.7	0.9	6.2	9.2	0.8	39.2	26.2	0.0	0.5	100.0

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

The *telecommunications sector* (STILE 1.2 or NACE 64.2) has with 5.7% a marginally higher proportion of job-to-job mobile, but still below the average in Belgium. Of all the job-to-job mobile employees, 25% remain within *Telecommunications*. Approximately 14% try their luck in the *Computer and related services sector (STILE 1.3)*, particularly in *Software* and *Hardware consultancy* (NACE 72.2 and 72.1). The rest leave the ICT sector altogether. Roughly 19% move to *Other services* (STILE 3.4) and in particular to *Business and management consultancy activities* (NACE 74.1), *Architectural and engineering activities and related technical consultancy* (NACE 74.2) and *Miscellaneous business activities* (NACE 74.8). Approximately 18% end up in the *Wholesale and retail trade and the hotel and catering industry (STILE 3.1)*, mainly in the *Wholesale of machinery, equipment and supplies* (NACE 51.6). The *Non-profit making services* (STILE 5.2) also absorb a significant proportion of the movers, mainly the *Administration of the State and the economic and social policy of the community* (NACE 75.1).

Again, we note that the main 'recipients' are also the main 'suppliers' of employees. Furthermore, the balance in 2000 was positive: the *Telecommunications* industry received more employees from other sectors than it let go.

The *computer and related activities sector* (STILE 1.3 of NACE 72) has the highest proportion of employees changing employer (15.3%). *Computer and related activities sector* is mainly determined by *Hardware* and *Software consultancy* (NACE 72.1 and 72.2) with mobility rates of 17.0% and 15.0% respectively.

Of all employees in the *computer and related activities* industry who change employer, 41% remain within the sector. However, the various subsectors of the computer and related activities industry differ: particularly the *Consultants* (NACE 72.1 and 72.2) remain within consultancy, while the other information scientists (NACE 72.3 to 72.6) are more likely to seek out another sector.

If we look specifically at the *Hardware* and *Software consultants*, we note that most of the movers go on to the *Wholesale trade* (respectively 17% and 15% to STILE 3.1), particularly to the *Wholesale of machinery, equipment and supplies* (NACE 51.6). Furthermore, a significant proportion end up in *Other services* (14% and 13% to STILE 3.4), more specifically in *Business and management consultancy activities* (NACE 74.1) and in *Architectural and engineering activities and related technical consultancy* (NACE 74.2). Another significant proportion moves to *Telecommunications* (hence remaining within ICT, STILE 1.2) or the *Financial sector* (STILE 3.3).

For the other subsectors in the *Computer and related activities industry*, the same scenario applies, with the difference that the proportion of 'movers' is larger. Most of them end up in *Wholesale of machinery, equipment and supplies* (NACE 51.6), in *Business and management consultancy activities* (NACE 74.1) and in *Telecommunications* (NACE 64.2).

The inflow into the *computer and related activities* industry originates mainly from *Wholesale trade* (more specifically from NACE 51.6) and *Other services* (particularly NACE 74.1). In 2000, the balance for the *computer and related activities* industry is clearly positive. Particularly the 'trade-off' with *Wholesale and retail trade* and with *Other services* is positive for the *computer and related activities* industry.

Previously, we observed that job-to-job mobility in the ICT sector was above average, particularly in the *Computer and related activities* sector. The analysis of the flows between sectors shows that the proportion of job-to-job mobile employees remaining within the ICT sector is below average. Furthermore, we established that the general trend of the proportion of 'stayers' being greater in the (commercial and non-profit making) services than in the industrial sectors also holds true within ICT: the *Industrial branch of the ICT* sector (STILE 1.1) has 11% 'stayers', compared to 25%

in the *Telecommunications industry* (STILE 1.2) and 41% in the *Computer and related activities sector* (STILE 1.3).

With regard to the flow between sectors, we can conclude that sectors give and take. The ICT sector particularly has a 'trade-off' relationship with the *Wholesale of machinery, equipment and supplies* (NACE 51.6), with *Business and management consultancy activities* (74.1) and *Architectural and engineering activities and related technical consultancy* (NACE 74.2). Furthermore, the industrial branch of the ICT (STILE 1.1) also finds 'receivers' and 'suppliers' in the *Manufacture of machinery and equipment* (NACE 29) and the *Manufacture of electrical machinery and apparatus* (NACE 31). For *Telecommunications* (STILE 1.2), it is the *Miscellaneous business activities* (NACE 74.8) and the *Administration of the State and the economic and social policy of the community* (NACE 75.1).

There are no differences between the age groups with regard to this general pattern. However, small differences exist between men and women. Male employees in the ICT sector who change employers more often remain within their own sector than women. If they change to a different sector after all, it is more likely to be another ICT sector than is the case for women. Women move more often than men to *Other services* (STILE 3.4), as well as to *Health care and welfare services* (STILE 5.1 and 5.2).

8.2 The European perspective

EU LFS respondents are asked their sector of employment for the year prior to the survey. Whereas it is not possible to distinguish sending sectors at the NACE two digit level with a sufficient degree of reliability, by grouping sending sectors according to particular aggregations, this sections tests to what extent it is possible to determine flows between ICT and other branches.

8.2.1 Inflows into or within the ICT sector

Table 8.4 therefore differentiates inflows into the ICT sector according to sector and working status. Three possibilities are given for the origin of the inflows. The first is the ICT sector, and provides the proportion off mobility that is intrasectoral. The second shows to what extent new recruits in the ICT sector have come from other sectors and the third shows the proportion that have come from either unemployment or inactivity.

Even at that level of aggregation, a significant number of cells have had to be suppressed since the reliability of the data is not high enough to satisfy the requirement guidelines provided by the Member States. Further country data is unavailable because the questions are not reported or surveyed at the national level. This means that, in all, indicators for only 40% or 12 countries can be presented in 2001; even fewer in 2002. Such coverage can only lead to the conclusion that for such detailed user requirements, the EU LFS is an unsuitable source of data.

Beyond that, there are other methodological considerations. For example, in Denmark and Iceland the number of people in the ICT sector is identical in year t-1 to year t (not in table). That is, if there are x number of people in ICT in 2002, their recorded sector of activity for the previous year (retrospective question) is identical. This indicates a methodological procedure followed at the national level, which has the effect that it is not possible to provide reliable information on sectoral mobility, in effect ruling out a further two countries.

Table 8.4 Inflows into the ICT sector - European countries, 2001 and 2002

	Inflows (%) in 2001 from			Inflows (%) in 2002 from		
	ICT	Other sectors	Unemploy-ment/ inactivity	ICT	Other sectors	Unemploy-ment/ inactivity
BE	35	31	35	48	29	23
CZ	35	41	25	39	26	35
DK	61	:	39	68	:	32u
DE	49	20	32	:	:	:
EE	:u	:u	:u	:u	:	:u
EL	:u	:u	:u	:u	:u	56u
ES	29	17	54	30	16	54
FR	36	31	33	40	33	27
IE	:	:	:	:	:	:
IT	37	21	42	:	:	:
CY	:u	:u	:u	:u	:	:
LV	:	:	:	:u	:u	:u
LT	:u	:u	:u	:u	:u	:u
LU	:u	:u	:u	:	:	:
HU	21u	39	40	32u	33u	35u
NL	:	:	:	:	:	:
AT	:	:	:	:	:	:
PL	:	:	:	:	:	:
PT	:u	:u	:u	:u	:u	:u
SI	:u	:u	:u	58u	:u	:u
SK	:u	:u	:u	:u	:u	:u
FI	40	35	25u	56	24u	:u
SE	43	40	:u	:u	:u	:u
UK	38	43	19	43	38	20
IS	83	:	:u	:u	:	:
NO	:u	57	:u	:u	:u	:u
CH	:	:	:u	:	:	100u
BG	:	:	:	:	:	:
RO	:	:	:	:u	:u	56

Exceptions to the reference year 2002: DE, LU = 2001.
: = not available; :u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data

8.2.2 Outflows from or within the ICT sector

Coverage of outflows from the ICT sector is better than when focus is on the inflows, at least when flows are going to the ICT sector. This is principally because according to the data in Table 8.5 the majority of flows in the ICT sector are intrasectoral. In other words, once people are in the ICT sector, then they do not appear likely to leave it, at least between 2000 and 2002.

Assessing outflows from the ICT sector to another sector of activity appears difficult. Some country data has to be suppressed due to the small number of cases that fall into this category and this is before the receiving sectors are divided even into, say, manufacturing or service sectors.

Table 8.5 Outflows from the ICT sector - European countries, 2001 and 2002

	Outflows (%) in 2001 from the ICT sector to			Outflows (%) in 2002 from the ICT sector to		
	ICT	Other sectors	Unemployment/ inactivity	ICT	Other sectors	Unemployment/ inactivity
BE	92	4	4	94	3	3
CZ	88	6	6	88	5	7
DK	100	:	:	100	:	:
DE	95	2	3	:	:	:
EE	80	:u	:u	87	:u	:u
EL	89	5u	6u	93	:u	4u
ES	91	4	5	89	5	6
FR	89	6	5	87	6	7
IE	:	:	:	:	:	:
IT	88	9	2	:	:	:
CY	93	:u	:u	92	:u	:u
LV	:	:	:	89	:u	:u
LT	81	:u	:u	82	:u	:u
LU	100	:u	:	:	:	:
HU	88	7	5	87	8	5
NL	:	:	:	:	:	:
AT	:	:	:	:	:	:
PL	:	:	:	:	:	:
PT	91	:u	:u	87	:u	:u
SI	98	:u	:u	88	9u	:u
SK	93	:u	6u	91	:u	6u
FI	93	4	3u	89	6	5
SE	88	8	4	87	8	6
UK	92	7	:u	92	8	:u
IS	98	:	:u	94	:	:u
NO	93	:u	:u	91	:u	:u
CH	:	:	:	:	:	:
BG	:	:	:	:	:	:
RO	89	9	:u	83	11	6

Exceptions to the reference year 2002: DE, LU = 2001.
: = not available; :u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data

It is also worth underlining that, for Belgium, this contradicts the information that is available via the Datawarehouse. In Table 8.5, 92% of flows from between 2000 and 2001 in the ICT sector were intrasectoral. From the Datawarehouse, Table 8.3 showed this to be a maximum of 41.3% within the ICT sector for *Computer and related activities*. These are significantly different results and it is difficult to understand why they should be as great as this. Given some of the questions over the reliability of certain EU LFS data at the very detailed level, the tendency is to place more trust in the figures from the DWH. Though this still does not mean that they are necessarily *right*, but rather that they are *more correct*, for of course, there are also issues related to the collection of data from the DWH. Such methodology and quality issues are dealt with in more depth in the next chapter.

Chapter
9

Methodology and quality issues

The previous chapters have outlined the methodological considerations for analysing mobility in the *e*Economy before looking at the intensity of ICT sector employment, its growth and other characteristics of its workers. They have also provided detailed analysis on the level, type and destination of mobility in Belgium as well as tested the possibilities for using the EU LFS to measure ICT sector mobility. In addition to establishing various trends for the broader indicators and for Belgium, the analysis has pointed to the existence of more acute problems when measurement using the EU LFS focuses on mobility in the ICT sector. This chapter therefore investigates in greater detail the methodological and quality issues linked to measuring mobility in the ICT sector, essentially asking the question how good a source is either the EU LFS or the DWH for measuring ICT sector mobility? To do so, it first looks at the advantages and limitations of the LFS, before carrying out the same exercise for the Datawarehouse. The third section then confronts the LFS data with that of the Datawarehouse.

9.1 Using the EU LFS to measure ICT sector mobility

There are a number of factors that need to be taken into consideration for assessing the degree to which the EU LFS is a suitable source for measuring ICT sector mobility. Apart from some general issues, the main criteria need to be first its accuracy in measuring ICT and second its suitability for measuring the dynamics of employment change.

The following SWOT analysis gives a summary of issues relevant to measuring mobility in the *e*Economy, before each issue is considered in more detail in turn.

Table 9.1 SWOT analysis on measuring mobility using the EU LFS

STRENGTHS	WEAKNESSES
• Eurostat co-ordinated → reasonable internationally comparability • Covered by legislation (guidelines for questions) • History of organisation/working practices • The largest data source in many countries • Qualitative info available (i.e. purpose of education or training) • Addressed to anyone (i.e. children, pensioners) • Relatively up-to-date	• Estimated data based on samples of individuals • Sampling errors • Other errors: misunderstanding question/answer; miscoding • Confidence interval → no detailed breakdown of some variables possible due to availability or reliability (i.e. NACE) • NACE sector information not detailed enough to get a precise definition of ICT • Proxy-respondents: questions can be answered for other individuals in the same household • Memory distortion and non-response (on questions related to 'situation one year before') → underestimation of mobility • Coding of NACE sector of economic activity based upon description by employee and not by firm
• LFS is increasingly being used for various research purposes: it is the largest data source in almost every country • Emphasis on qualitative information • Following transition to continuous survey, use of annual averages instead of only spring quarter may increase data reliability	• More and more information is being registered
OPPORTUNITIES	**THREATS**

Source: Camire, Steunpunt WAV, 2004

9.1.1 General issues

Surveys such as the LFS have many advantages. The LFS is addressed to anyone, regardless of their professional status. Self-employed as well as wage earners, those in jobs as well as unemployed, children as well as those on bridging pensions schemes are all included. This means that the resulting statistics are far-reaching. Because the survey is co-ordinated by Eurostat, comparisons can be drawn within Europe, and, to the extent that data is available, homogeneous time sequences can be developed because the LFS is repeated on an annual (and since 2002 continuous) basis. Furthermore, the information is relatively up-to-date, and biographical variables like age and level of education are also included. Surveys may also be useful for obtaining more qualitative information. For instance, for the unemployed (though unfortunately not for the whole population) it is possible to request information concerning the voluntary or involuntary nature of the mobility from the LFS information. Are people moving of their own free will or were they dismissed? This sort of information is not available from administrative databases.

Surveys obviously also have disadvantages. For example, the results need to be interpreted within a certain confidence interval because only a small proportion of the total population is used to formulate general statements about the population as a whole. Apart from these 'sampling errors', other errors disconnected from the sample exist, for instance because questions were misunderstood, the interviewer wrongly coded or misunderstood the response, etc.

9.1.2 Measuring the ICT sector using the EU LFS

As a reminder, the definition of ICT followed in *Measuring the ICT sector*, the definition of ICT is based on the principle that products in the manufacturing sector (OECD, 2000):

- must be intended to fulfil the function of information processing and communication including transmission and display;
- must use electronic processing to detect, measure and/or record physical phenomena and communication by electronic means;

and that products in the service sector:

- must be intended to enable the function of information processing and communications by electronic means.

Table 9.2 provides a statistical comparison of the number of people employed in the ICT sector when following the three digit definition used in *Measuring the ICT sector* (OECD, 2000) and when using the adapted two digit approach followed in this report. The table includes each economic activity that is considered to be ICT, both at the three digit level and for its relevant two digit NACE code. The shaded areas of the table highlight the two digit NACE codes that have been included in the definition of the ICT sector in this report. The NACE two digit definition of ICT used in this report therefore excludes *Manufacture of electrical machinery and apparatus n.e.c.* (NACE 31), *Wholesale trade and commission trade, except of motor vehicles and motorcycles* (NACE 51) and *Renting of machinery and equipment without operator and of personal and household goods* (NACE 71).

The reduced number of countries in the table reflects the availability of data at the NACE three digit level sent to Eurostat, even if in some cases, this level of detail is available at the national level. In effect, this shortage of comparable detailed data according to sector of economic activity has been the principle reason for the development of a *proxy* ICT sector at the division level (two digit) of the NACE nomenclature.

Where data is available or of a sufficient reliability to present, Table 9.2 highlights the small share that *Insulated wire and cable* (NACE 31.3) accounts for in *Manufacture of electrical machinery and apparatus n.e.c.* The maximum share is in Spain, where it represents around 18% of employment in the division (14,500 of 79,300 people), but in Germany employment in NACE group 31.3 accounts for only 5% of employment in NACE division 31 (18,300 of 363,000). Similar coverage is evident in *Wholesale trade and commission trade, except of motor vehicles and motorcycles* even if the proportion of employment in *Renting of machinery and equipment without operator and of personal and household goods* allocated to *Renting of office machinery and equipment (including computers)* is slightly higher.

Table 9.2 Comparison of ICT sector using two digit and three digit definitions, thousands of 25-64 year olds in the ICT sector in 2001 - available European countries

NACE Rev. 1.1	CZ	DE	ES	FR	LT	LU	HU	AT	PT	SK	IS	CH
30	8.8	96.6	13.8	40.1	:u	:u	11.3	7.0	:u	:u	:u	:u
31	60.1	363.8	79.3	165.5	:u	:u	57.7	15.2	28.5	18.8	:u	29.3
313	*8.1*	*18.3*	*14.5*	*27.6*	*:u*	*:*	*10.3*	*:u*	*:u*	*:u*	*:*	*:u*
32	32.0	270.4	37.2	129.7	6.0	:u	48.5	19.7	:u	11.4	:u	19.7
321	*25.3*	*168.3*	*17.9*	*69.2*	*:u*	*:*	*30.8*	*7.9*	*:u*	*5.3*	*:*	*11.1*
322	*3.5*	*78.2*	*12.7*	*48.2*	*:*	*:*	*4.5*	*3.6*	*:u*	*:u*	*:*	*:u*
323	*3.1*	*23.9*	*6.6*	*12.3*	*:u*	*:*	*13.2*	*8.2*	*:u*	*:u*	*:*	*:u*
33	21.1	262.4	26.0	131.0	:u	:u	15.5	27.0	:u	:u	:u	67.8
332	*8.4*	*70.9*	*:u*	*54.5*	*:u*	*:u*	*4.7*	*15.4*	*:u*	*:u*	*:*	*15.1*
333	*1.0*	*:u*	*:u*	*14.9*	*:*	*:*	*:u*	*:*	*:*	*:*	*:*	*:u*
51	137.5	1 019	494.0	887.6	38.7	6.1	66.1	112.7	122.6	47.1	4.8	169.1
516	*7.9*	*90.4*	*51.0*	*275.5*	*:u*	*1.8*	*6.9*	*14.6*	*:u*	*:u*	*:u*	*42.1*
64	76.6	549.3	222.9	480.9	20.5	3.4	75.4	61.2	38.2	36.7	2.5	82.8
642	*33.2*	*233.2*	*145.1*	*185.8*	*9.1*	*:u*	*24.0*	*22.3*	*21.4*	*16.1*	*1.5*	*22.6*
71	4.0	44.9	27.5	53.8	:u	:u	:u	4.0	:u	:u	:u	:u
713	*2.0*	*9.2*	*10.3*	*19.6*	*:u*	*:u*	*:u*	*:u*	*:u*	*:u*	*:u*	*:u*
72	38.1	399.3	122.8	272.5	:u	:u	27.3	34.8	:u	11.5	2.8	49.3
721	*2.7*	*8.6*	*:u*	*109.5*	*:*	*:u*	*6.3*	*:*	*:u*	*:u*	*:*	*:u*
722	*19.2*	*252.1*	*87.1*	*106.0*	*:u*	*:u*	*15.3*	*7.5*	*:u*	*6.0*	*2.4*	*41.3*
723	*5.8*	*105.5*	*:u*	*36.5*	*:*	*:u*	*:u*	*22.0*	*:u*	*:u*	*:u*	*:u*
724	*1.0*	*:u*	*:u*	*:u*	*:*	*:*	*:u*	*4.3*	*:*	*:u*	*:*	*:u*
725	*3.3*	*9.8*	*7.2*	*12.7*	*:u*	*:*	*:u*	*:u*	*:u*	*:u*	*:u*	*:u*
726	*5.9*	*19.3*	*17.6*	*:*	*:u*	*:u*	*:u*	*:u*	*:u*	*:u*	*:u*	*:u*
ICT (NACE 2D)	177	1,578	423	1,054	30	5	178	150	71	64	5	224
ICT (NACE 3D)	139	1,196	399	1,020	21	4	135	117	67	46	5	163
Difference (1,000s)	37	382	23	34	9	1	43	33	4	18	0	61
Difference (%)	27	32	6	3	44	26	32	28	7	41	6	37

: = not available; :u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data

Even with these two digit NACE sectors excluded, the definition of ICT still inflates levels of employment beyond those given by a closer adherence to the principles laid out in the definition at the beginning of this section. Although there are countries for which the application of this definition has a modest quantitative effect on the results obtained (for example France where data is inflated by 3% or Spain and Iceland, 6%), there are others where this definition has a more serious effect on the accuracy of the estimates. In volume terms, the largest impact is in Germany, where following the two digit definition, the estimation for ICT employment in 2001 was around 1,578,000 people. Following the stricter three digit definition, ICT employment would instead have been estimated in Germany at 1,196,000 people. This inflates the figures by around 32%. In Lithuania, employment in the two digit ICT sector is 44% above its three digit counterpart.

As well as having a quantitative effect, the adoption of this definition can also have a qualitative effect. For example, even if the quantitative effect were zero, with the overrepresentation of one subsector being exactly equal to the underrepresentation of another, then the people that are included at the expense of the excluded may not have the same characteristics i.e. gender, level of education or age.

The effects are of course not limited to the country level, but also translate to any calculated estimates for the European Union. It is, of course, impossible to test the effect of the adoption of this two digit definition on the remaining seventeen countries for which EU LFS data is available.

Even if there is a clear impact on the comparability of the data concerning the ICT sector at the two digit level, it is also worth recognising the problems that result from analysing sector and occupation data at too detailed a level and the consequences that this can have, especially for analysis at the international level. Workpackage 3 of the STILE project, on NACE and ISCO classifications of *e*Business and *e*Workers, has been dedicated to such issues and has highlighted the differences in coding procedures between countries for the same sector description. This ultimately leads to different results according to country, which seems to be exacerbated at the more detailed level of the nomenclature.[19]

9.1.3 Measuring mobility using the EU LFS

There are a number of different ways of measuring mobility using the Labour Force Survey. One way is the panel approach. This means that it essentially follows the person in the sample throughout their surveying period and involves making two extractions of data and comparing for the same group of sampled individuals key information such as working status or sector of activity. The disadvantage of this method is that if a measurement of mobility between one year and the next is desired, then because respondents only participate in the survey for a limited period of time, the number of people for which data is available at both points will be small and not necessarily representative of the economy as a whole. This is because in order to implement the Labour Force Survey, each country has a number of 'waves', which differs from country to country, and a certain proportion of the sampled population will be replaced each wave. For example, if a country has five waves and one-fifth of the sample is replaced by a new set of respondents each quarter, then after one year only 20% of the original population will be available on which to base the analysis.

19 For further information on this issue, see the workpackage of the STILE project on coding of sectors and occupations in the *e*Economy.

Another way of calculating mobility is to use the answers to the retrospective questions that are included in the EU LFS list of questions, the approach followed in this report, and which is considered next.

Retrospective questioning[20]

As we have seen, using LFS data carries certain disadvantages specific to the way in which mobility is measured. Surveys, as with anything that requires documentation and reporting, are subject to errors. As well as sampling errors, the results are also subject to non-sampling errors, or measurement errors. These measurement errors have been shown to be related to such aspects as the questions individuals are asked, their order, the coded choices they are offered, the characteristics of the interviewer and the type of interview (Dex & McCulloch, 1997).

In addition to these measurement errors, measuring mobility using data available from retrospective questioning relies on information being provided after the actual event. In event history analysis, studies have shown that the relationship between the accuracy of recalled events and the period of time elapsed is complex. That while, in general, the greater the period of time elapsed the less likely it is that events will be recalled correctly, certain salient events may be more likely to be recalled correctly over long time periods, whereas others can suffer from recall bias, even over relatively short periods.

In this context, a number of studies have dealt with the issue of retrospective questioning in surveys and the reliability of the reported results. Retrospective questioning can induce recall bias of both a random and a systematic nature. There are a variety of different factors, which have been shown to have an effect on recall error. These are the length of the recall period, the complexity of the reporting task, and the saliency, pleasantness and social desirability of the events being recalled (Paull, 2002).

Further studies have indicated that certain demographic or socio-economic characteristics can also have an effect on the reliability of the recalled data, and in particular such characteristics as age, sex or level of education (Smith & Thomas, 2002). The young are more likely to recall events accurately than the old, men are more likely to recall events correctly than women and the educated show a higher propensity to recall events precisely than individuals with lower educational attainment.

But as well as being affected by the characteristics of the reporting individual, the accuracy of recalled events can also be influenced by the nature of the event itself. For example, spells of unemployment are less likely to be recalled correctly than spells of employment and shorter spells of any sort are less likely to be recalled correctly than longer spells (Paull, 2002).

Research by the CBS has also shown that asking information about the situation one year ago produces some memory distortion (Allaart, 2000). The effect of memory distortion is mainly one-way, according to Allaart, namely in the direction of an underestimation of mobility flows.

A second reason for underestimating the actual number of transitions follows from the fact that people may be changing to and from two divisions throughout the year. For instance, an unemployed person may have worked for a number of months in the course of a year, but find himself unemployed again by the end of the year. Judged

20 Much of this information can be found in the report carried out for the European Commission entitled *Quality problems of measuring mobility with the EU LFS*, January 2004.

by the definition used above, this person is not considered as mobile. Other examples are people working for agencies. It is doubtful whether an agency worker placed with various employers interprets his/her activities as mobility between different employers.

A previous analysis conducted by the Steunpunt WAV (1998) has indicated that the volume of this 'interim' mobility tends to be minimal. The analysis covered the period January to December 1994, and it was based on the monthly reports of the labour market situation of 1,806 Flemish respondents between 20 and 59 years old in the PSBH-sample group. Of the group of respondents that remained in the same division after one year, only 2.4% had disappeared from the division in the course of the year and had been mobile during the year.

Though, with EU LFS data, no judgement can be carried concerning the length of the spell, it is possible to consider the accuracy of the nature of the event. Comparisons made using the EU LFS of declared employment states in the actual year and retrospective questioning a year later on their employment status for the same reference year tend to corroborate the findings in previous studies (Table 9.3, on the EU-15 only). Despite the fact that some differences are to be expected due to such aspects as evolving sampling frames (a new individual may not have the same event history as the person in the sample that has been replaced), quite often the differences go beyond. For 65% of country aggregates, the number of employed is lower when declared retrospectively than in the year of reference. Or, in other words, the propensity to declare oneself as employed is lower when the question is posed concerning an historical labour market state than when it is posed concerning the actual state. For unemployment, though, it is just as likely that recall may bias in an upward direction as downward. Inactivity, on the other hand, is more likely to be overreported on a retrospective basis, with 63% of country aggregates being higher when declared one year later than in the reference year.

The magnitude of difference between the reference year and the recalled year is highest for the unemployed. On average, the difference between the reference year and the recalled year is 2.8% for the employed, 17.8% for the unemployed and 5.5% for the inactive, with the caveat that the unemployed have by far the smallest population in each country and are therefore the most sensitive to measured change. The standard deviation, which can be considered a proxy for the extent to which events are recalled reliably, bears out this result for each of these working states.

Given that no information could be extracted concerning the proportion of the sample that had been replaced in the following year, it is difficult to judge to what extent the new subsample is responsible for the *noise*. Nevertheless, since samples are designed so that results between waves are not radically different in terms of their make-up, only minor differences should be expected to occur as a result.

Using the British Household Panel Survey, Paull tests whether recall error has random or systematic bias on the results obtained (Paull, 2002), with the results suggesting that the recall effects are not random. The findings do suggest, however, that on a general level most individuals give *consistent* reports when asked to recall their labour market behaviour a year later, though this can differ according to the type of information requested. "Individuals with the most transient behaviour are more likely to give inconsistent accounts."

Table 9.3 Differences in working status declared for the same reference year and retrospectively one year later using the EU LFS, non-response to working status one year earlier - available European countries, 1997-2001

		Working status in year t			Difference between declared status in year t and status declared retrospectively for year t (in 1,000s)			Difference between declared status in year t and status declared retrospectively for year t (in %)			Non response among total declarants of their status in year t-1	
		Employed	Unemployed	Inactive	Employed	Unemployed	Inactive	Employed	Unemployed	Inactive	1,000s	%
BE	1997	3,838	378	4,128	41	74	-2,006	1.1	19.5	-48.6	1,913	22.9
	1998	3,857	397	4,111	42	94	-92	1.1	23.7	-2.2	-	-
	1999	3,987	378	4,044	28	79	-81	0.7	21.0	-2.0	-	-
	2000	4,120	290	4,024	-109	122	10	-2.6	42.1	0.3	-	-
	2001	4,039	266	4,154	9	176	-139	0.2	66.0	-3.3	-	-
DK	1997	2,675	153	1,493	-164	1	-561	-6.1	0.9	-37.6	731	16.9
	1998	2,679	142	1,507	-122	0	-590	-4.5	-0.2	-39.2	722	16.7
	1999	2,708	147	1,484	-149	-26	-583	-5.5	-17.6	-39.3	758	17.5
	2000	2,716	127	1,495	-134	-7	-256	-4.9	-5.4	-17.1	410	9.4
	2001	2,717	118	1,517	-113	-3	-306	-4.2	-2.3	-20.2	432	9.9
DE	1997	35,299	3,863	28,742	-3,214	-48	1,597	-9.1	-1.3	5.6	2,053	3.0
	1998	35,537	3,856	28,898	-3,263	-356	353	-9.2	-9.2	1.2	3,402	5.0
	1999	36,089	3,506	28,831	-3,062	-308	666	-8.5	-8.8	2.3	2,929	4.3
	2000	36,324	3,123	29,205	-2,935	99	334	-8.1	3.2	1.1	2,751	4.0
	2001	36,528	3,078	29,297	:	:	:	:	:	:	-	-
EL	1997	3,853	408	4,461	100	50	-154	2.6	12.4	-3.5	-	-
	1998	3,967	478	4,274	-46	-11	141	-1.2	-2.2	3.3	-	-
	1999	3,940	523	4,340	-44	-33	150	-1.1	-6.4	3.5	-	-
	2000	3,946	491	4,439	-46	-71	195	-1.2	-14.4	4.4	-	-
	2001	3,918	445	4,592	19	-28	32	0.5	-6.4	0.7	-	-
ES	1997	13,191	3,476	16,148	-546	-62	149	-4.1	-1.8	0.9	710	2.1
	1998	13,719	3,177	16,171	-92	-20	369	-0.7	-0.6	2.3	-	-
	1999	14,508	2,676	16,140	69	129	175	0.5	4.8	1.1	-	-
	2000	15,306	2,466	15,924	3	103	293	0.0	4.2	1.8	-	-
	2001	15,877	1,833	16,386	-13	625	-299	-0.1	34.1	-1.8	-	-
FR	1997	21,958	3,156	20,181	-18	198	143	-0.1	6.3	0.7	7	0.0
	1998	22,248	3,055	20,320	24	242	-22	0.1	7.9	-0.1	-	-
	1999	22,507	3,064	20,297	69	214	63	0.3	7.0	0.3	21	0.0
	2000	23,123	2,631	20,481	50	277	120	0.2	10.5	0.6	1	0.0
	2001	23,678	2,231	20,775	80	424	-235	0.3	19.0	-1.1	3	0.0

Table 9.3 Differences in working status declared for the same reference year and retrospectively one year later using the EU LFS, non-response to working status one year earlier - available European countries, 1997-2001. Continued

		Working status in year t			Difference between declared status in year t and status declared retrospectively for year t (in 1,000s)			Difference between declared status in year t and status declared retrospectively for year t (in %)			Non response among total declarants of their status in year t-1	
		Employed	Unemployed	Inactive	Employed	Unemployed	Inactive	Employed	Unemployed	Inactive	1,000s	%
IE	1997	1,373	156	1,229	:	:	:	:	:	:	2,871	100.0
	1998	1,496	125	1,251	:	:	:	:	:	:	2,915	100.0
	1999	1,593	96	1,226	:	:	:	:	:	:	2,963	100.0
	2000	1,671	76	1,216	:	:	:	:	:	:	3,018	100.0
	2001	1,716	66	1,235	:	:	:	:	:	:	3,075	100.0
IT	1997	20,032	2,827	25,064	-590	880	269	-2.9	31.1	1.1	-	-
	1998	20,357	2,807	25,317	-630	875	-147	-3.1	31.2	-0.6	-	-
	1999	20,618	2,729	25,233	-845	1,235	-210	-4.1	45.2	-0.8	-	-
	2000	20,930	2,545	25,284	-775	926	32	-3.7	36.4	0.1	-	-
	2001	21,373	2,268	25,301	:	:	:	:	:	:	49,126	100.0
LU	1997	169	4	165	1	0	3	0.3	-10.7	1.8	-	-
	1998	171	5	166	3	-2	1	1.9	-33.9	0.8	-	-
	1999	176	4	164	3	-1	1	1.5	-32.9	0.6	-	-
	2000	181	4	162	1	-1	3	0.8	-12.7	1.9	-	-
	2001	185	3	162	:	:	:	:	:	:	-	-
NL	1997	7,186	419	4,874	-37	196	-108	-0.5	46.7	-2.2	21	0.2
	1998	7,402	340	4,808	-6	183	-115	-0.1	53.9	-2.4	16	0.1
	1999	7,605	286	4,738	:	:	:	:	:	:	15,667	100.0
	2000	7,860	220	4,638	:	:	:	:	:	:	15,821	100.0
	2001	8,065	175	4,599	:	:	:	:	:	:	15,948	100.0
AT	1997	3,609	196	2,706	:	:	:	:	:	:	6,502	99.7
	1998	3,626	212	2,684	:	:	:	:	:	:	6,519	99.6
	1999	3,678	181	2,683	:	:	:	:	:	:	6,561	99.7
	2000	3,684	181	2,718	:	:	:	:	:	:	6,587	99.6
	2001	3,697	154	2,761	:	:	:	:	:	:	6,640	99.9
PT	1997	4,523	318	3,543	113	5	-301	2.5	1.6	-8.5	11	0.1
	1998	4,764	235	3,215	-5	31	14	-0.1	13.1	0.4	11	0.1
	1999	4,830	233	3,200	-35	17	42	-0.7	7.2	1.3	8	0.1
	2000	4,898	197	3,200	-41	79	-114	-0.8	40.2	-3.6	134	1.6
	2001	4,984	204	3,167	50	88	72	1.0	43.4	2.3	134	1.5

Table 9.3 Differences in working status declared for the same reference year and retrospectively one year later using the EU LFS, non-response to working status one year earlier - available European countries, 1997-2001. Continued

		Working status in year t			Difference between declared status in year t and status declared retrospectively for year t (in 1,000s)			Difference between declared status in year t and status declared retrospectively for year t (in %)			Non response among total declarants of their status in year t-1	
		Employed	Unemployed	Inactive	Employed	Unemployed	Inactive	Employed	Unemployed	Inactive	1,000s	%
FI	1997	2,120	373	1,653	-55	-10	84	-2.6	-2.8	5.1	1	0.0
	1998	2,179	332	1,655	46	-24	-44	2.1	-7.3	-2.7	52	1.2
	1999	2,333	309	1,553	-78	-18	13	-3.4	-5.7	0.9	102	2.4
	2000	2,367	297	1,550	-65	-20	52	-2.7	-6.8	3.3	51	1.2
	2001	2,403	276	1,554	-63	-27	57	-2.6	-9.8	3.6	50	1.2
SE	1997	3,917	453	2,818	:	:	:	:	:	:	4,586	63.7
	1998	3,946	387	2,867	:	:	:	:	:	:	4,550	63.1
	1999	4,054	334	2,820	:	:	:	:	:	:	3,855	53.4
	2000	4,125	239	2,860	:	:	:	:	:	:	4,883	67.3
	2001	4,339	215	2,705	:	:	:	:	:	:	4,696	64.3
UK	1997	26,744	2,035	17,743	-1,690	-444	418	-6.3	-21.8	2.4	1,889	4.0
	1998	27,051	1,789	17,856	-1,888	-374	259	-7.0	-20.9	1.5	2,299	4.9
	1999	27,418	1,772	17,802	-2,088	-496	239	-7.6	-28.0	1.3	2,628	5.6
	2000	27,862	1,644	17,769	-2,385	-522	520	-8.6	-31.7	2.9	2,686	5.6
	2001	28,149	1,389	18,035	-2,167	-354	247	-7.7	-25.5	1.4	2,550	5.3
No. of under-declaring country/year aggregates					35	27	20					
No. of over-declaring country/year aggregates					19	27	34					
Mean difference in reporting								2.8	17.8	5.5		
Standard deviation								3.4	23.3	11.7		

Note: : = not available; - = real zero.
Source: EU LFS, spring data, from Quality problems of measuring mobility with the EU LFS, January 2004

Proxy-responses

Another specific problem for the LFS is that it works with proxy-respondents, which may affect the reliability of the data: in order to reduce the non-response, a member of the household is allowed to answer questions on behalf of the absent respondent. In Belgium, for example, the replies of approximately one in four respondents are obtained by proxy (for youngsters six out of ten). The proxy-respondents may have replied differently to certain questions than the actual respondent would have done. It is assumed that members of the same household are well informed about the most important characteristics and activities of the intended respondent. Statistics Canada has stated in a paper on the quality of LFS data that the information on the labour market situation (whether someone is employed, unemployed or not professionally active) and about personal characteristics tends to be good quality, even when provided by proxy-response. Other, more specific information on the family member, on the other hand, may be less accurate, i.e. the usual number of hours worked or the description of the activity sector (Statistics Canada, 2003). Research in the United States has shown that replies from the respondents themselves and from proxy-respondents resulted in the same labour market classification in 83% of all cases (employed, unemployed, not professionally active). On more specific points (i.e. the number of hours worked, salary, etc.), the answers only coincided in 70% of the replies (Boehm, 1989). The problem of memory distortion will be exacerbated by the use of proxy-respondents, from whom responses are probably even less reliable about the situation in the labour market one year ago.

The EU LFS and the national surveys: the case of France

Apart from retrospective questioning affecting the quality of the results, though the EU LFS is a relatively harmonised source of data, its list of questions is provided as a guideline only to the Member States. In practice this means that the questions may not be formulated in exactly the same way in different countries, which can lead to different results. In the French Labour Force Survey (INSEE, 2001), for example, the question on when you began working for your current employer (TOW) is:

- 'At what date did you start working for the ENTERPRISE (the firm) who currently employs you (or which you currently manage)?'

Whereas in the EU LFS, it is worded as follows:

- 'Year/month in which person started working for this employer or as self-employed.'

In the French LFS the definitions for establishment and enterprise can be roughly translated to mean:

- 'The establishment is a production unit situated in an area which is topographically different from, and in which one or more people work on behalf of, the same enterprise.'
- 'The enterprise is an organisation, legally defined, with a separate financial statement. It is subject to a directing authority that can be an individual or legal entity that exercises one or more non-salaried professional activities of production, of goods or of services.'

These definitions clarify that those people surveyed are only considered mobile if the enterprise that they work for is different from one year to the next. According to the question in the EU LFS highlighted above on when you began with your current em-

ployer, it is unclear whether movements between establishments of the same enterprise will be taken into account or whether only movements between enterprises will translate into occupational mobility. Should diverse methods be used in different countries then this will obviously have an effect on the comparability of the results with other countries. But that is not all. If only job mobility between enterprises is accounted for, then this is actually missing out on a crucial portion of job-mobile employees.

Concluding remarks

What does all this tell us for the purposes of measuring mobility in the ICT sector using the EU LFS? There are clearly some issues related to the measurement of mobility using the EU LFS, which apply regardless of whether focus is on the ICT sector or not. But whereas it seems that certain modifications could be made to the EU LFS to improve the measurement of total mobility, when it comes to measuring mobility in the ICT sector, the principal problem is one of coverage in terms of sample size. Therefore other than a dramatic (and utopian) increase in the size of the sample in most countries, there is little that could be done to improve the availability of data. This is not a realistic recommendation and as such it seems as though little other conclusion can be drawn on the use of EU LFS data for the purposes of measuring mobility in the ICT sector. On the other hand certain changes could be made to improve the reliability and comparability of LFS data on mobility in general and these are discussed in Chapter 10.

9.2 Using the Belgian Datawarehouse to measure ICT sector mobility

The measurement of mobility using the Belgian DWH raises another set of methodological questions. The SWOT analysis showed in Table 9.4 gives a summary of issues relevant to measuring mobility in the *e*Economy using the DWH, before each issue is considered in more detail in turn.

A number of disadvantages inherent to the LFS can be dealt with by means of an administrative database like the Datawarehouse Labour Market. The exhaustive character of this database prevents the need for the results to be extrapolated, and no interval needs to be observed for the sake of reliability. Overall, this source can be recommended, particularly for relatively small populations. This makes it suitable for the analysis of mobility between various sectors of activity, for instance.

Table 9.4 SWOT analysis on measuring mobility using the DWH

STRENGTHS	WEAKNESSES
• Exhaustive → detailed breakdown of variables (i.e. NACE sector of activity), no sampling errors, no proxy-respondents; no memory distortion • Measuring combination of activities possible • Quarterly data on individual level: career-path analysis possible • Relatively up-to-date	• Not internationally comparable • Coverage is around 90% of inhabitants (i.e. no pensioners); the missing 10% are mostly non-active people • No qualitative data - data is gathered for administrative purposes, not for research • Delays in registration can affect the data quality • Mobility of job = mobility of enterprise (there is no information on establishments) • Administrative change of ID-number of enterprises (mergers, split-offs, take-overs) leads to re-coding and can therefore overestimate mobility ('false' mobility) • No information on educational attainment is available
• Importance of register data is set to increase (due to software/hardware penetration) • 'False' mobility will be resolved through use of unique ID-number allocated to establishments • The use of this unique ID-number will result in the collection of data at establishment level • Coverage will increase since more databases will be linked to the Datawarehouse (i.e. for pensioners)	• Changes in public opinion/legislation on privacy could affect use of data in Belgium
OPPORTUNITIES	**THREATS**

Source: Camire, Steunpunt WAV, 2004

Furthermore, this sort of database is not affected by memory distortion or by the problem of proxy-respondents and more variables can be taken into account (i.e. work regime). On the other hand, a number of factors cause administrative databases to overestimate trends (unless a few careful corrections are made). Firstly, register data is inevitably contaminated, because variations are not incorporated on time or are corrected at a later date. This administrative delay affects the analysis of socio-economic mobility on a quarterly basis. Secondly, they contain many inaccurate transitions. For instance, apparent transitions from one employer to another only because the employer's registration number in the database has changed. Mergers, workers becoming self-employed or departments that become detached from mother firms, as well as purely judicial changes such as the status of the enterprise or a different company name, - they all lead to transitions which the employees themselves do not experience as job changes, and they will not be reported as such (Allaart, 2000). To a certain degree, this 'false' mobility is corrected for in the Datawarehouse. We developed an algorithm in order to make a distinction between 'individual' (I), 'collective' (C) and 'no' (Q) mobility and people in a special (S) employment regime. This algorithm has been applied to all wage earners who then receive a mobility code

I, C, Q. Only people with a 'special' regime were excluded and receive no mobility code (S).[21]

The idea is that if a certain transition from employer X to employer Y between two quarters is being made by 20 employees or more, this change of employer identification number is considered to be a statistical artefact. The employee making this transition gets a code 'C' and is not considered to have been mobile.

Another problem of register data is that people may be included in several divisions. A frequent combination is of work and benefits. It is fairly important for the size of the trends whether someone who is partially disabled, but who continues to work for the same employer, is counted as still at work or making an exit from the labour market (Allaart, 2000). In the Datawarehouse, the problem does not occur, due to the coupling of various administrative databases by means of a unique identification number, resulting in an extensive and detailed socio-economic nomenclature.

The fact that a change of jobs is in fact counted as a change of legal employer is another problem inherent to the Datawarehouse. It means that no information is available on the level of the local establishment, but only on the level of the legal employer i.e. the enterprise (the Belgian LFS, on the other hand, measures the local establishment level). In the DWH, a change of establishment within the same enterprise is therefore not classified as mobility. The DWH is also unable to measure internal mobility (for example, through promotion) within an establishment or enterprise. Information about mobility within the enterprise is in fact a less relevant problem in the context of studies on the mobility of knowledge and know-how, since the knowledge remains in the possession of the enterprise in those cases. However, the intra-firm mobility plays an important role in studies about the efficient allocation of knowledge and know-how within the company.

Concluding remarks

Generally speaking there's a lot of information registered already, and more and more information is being registered. But most register data is collected for administrative purposes, not for research. On the other hand, there is a growing awareness of the usability of register data for research as well as for policy monitoring and, as such, efforts are being made to improve the usability of the register data for research/policy. An example would be the use of a unique ID-number for establishments and the growing willingness to link more databases to the Datawarehouse. The major threat for the Datawarehouse in Belgium is a change in public opinion, the consequence of which could be pressure to change the legislation on data protection and privacy, having an impact on the use of register data for research.

9.3 Confronting the Labour Force Survey with the Datawarehouse

When analysing data about labour market phenomena, it is important to obtain some indication of the quality and reliability of the data used. By confronting both sources, we can learn something about the reliability and quality of each source. Since the LFS in Belgium only disposes of the NACE codes down to the two digit level, information from the Datawarehouse is also presented at the two digit level. In practical terms, it means that the entire NACE sector 33 will be incorporated into STILE sector

21 There are four types of regime: full-time, part-time, special and undefined. The special regime refers to seasonal work and temporary work (literally 'at short intervals'). These workers are believed to be mobile by definition and they would distort the mobility rates of the total population.

1.1 and that the whole of NACE sector 64 will be incorporated into STILE sector 1.2. Below, we will compare both sources on a number of different levels. Firstly, we compare certain stocks: total population, number of people in work and the number of (wage-earning) employees distributed by age, gender and activity sector. Subsequently, we use both sources to calculate some flows, namely the flows into and from the working segment.

9.3.1 Comparison of stocks

In the first instance, we compare the total population aged between 15 and 64 of both sources. This immediately shows that some people (6.3%) are missing in the Datawarehouse (the LFS is an extrapolation for the entire population). As mentioned above, the population of the Datawarehouse consists of all people who were known to one of the social security institutions involved in the Datawarehouse during one quarter. Added to these are the individuals' family members (in so far as they are not already known by one of the participating institutions). Part of the total population is therefore missing from the Datawarehouse. Presumably, most of them are inactive (i.e. pensioners and/or people fulfilling domestic tasks), but employees such as outbound frontier workers and unpaid helpers (of the self-employed) are also absent. Of the group of unemployed, only those receiving benefits are represented in the Datawarehouse (constituting the vast majority, however).

The fact that retired people make up an important part of the missing numbers can be deduced from a strong deviation between both sources with respect to the age group of the 45 to 64 year olds, especially women (17.9%). For women, the official retirement age in 2000 was 62 (for men, it was 65). It explains why many women over 62 'disappear' from the Datawarehouse. Furthermore, the highest age group contains many women who have never or rarely entered the labour market. These women do not feature in the Datawarehouse unless they are known through their husbands.

Deviations also exist with regard to the working segment. On the basis of the LFS, two methods can be used to demarcate the number of people in work: either according to the ILO-definition (having worked for more than one hour during the reference week) and according to subjective questioning (for Belgium, question 81).

Table 9.5 Total population aged 15-64 years old according to LFS and DWH - Belgium, 2000

Age	LFS (annual average)			DWH (2nd quarter)			Difference		
	Total (n)	Men (n)	Women (n)	Total (n)	Men (n)	Women (n)	Total (%)	Men (%)	Women (%)
15-24 years	1,243,900	631,700	612,300	1,220,600	619,500	601,100	1.9	2.0	1.9
25-34 years	1,459,000	740,000	719,200	1,397,500	707,300	690,200	4.4	4.6	4.2
35-44 years	1,588,600	803,100	785,400	1,541,800	778,300	763,500	3.0	3.2	2.9
45-64 years	2,427,600	1,208,800	1,218,800	2,161,400	1,127,900	1,033,600	12.3	7.2	17.9
Total	6,719,200	3,383,600	3,335,600	6,321,400	3,233,000	3,088,300	6.3	4.7	8.0

Source: NIS LFS, KSZ-DWH Labour Market (Processing Steunpunt WAV)

Table 9.6 Number of people in work according to LFS and DWH - Belgium, 2000

Working segment	LFS (average 2000) (n)	DWH (2nd quarter 2000) (n)	Difference (n)	(%)
q81	3,947,800	3,830,700	117,100	3.4
ILO	4,067,100	3,830,700	236,400	6.2

Source: NIS LFS, KSZ-DWH Labour Market (Processing Steunpunt WAV)

The LFS gives a higher number of people in work than the Datawarehouse. Remarkably, the difference is nearly twice as big compared to the ILO-definition in the LFS. This definition is very broad in the sense that any person working just one hour during the reference week (paid or unpaid as a volunteer) is considered to be in work. For example, if students who worked for at least one hour are asked in question 81 to specify their socio-professional status, they will presumably define themselves as students rather than employees. They will nevertheless be classified as workers following the ILO definition.

The differences between the LFS and the DWH can be attributed to several reasons. In the first place, the measuring methods are obviously entirely different: a comprehensive administrative registration (of a large part of the total population) compared to an extrapolated verbal questioning (for one in four respondents even via proxy-respondents).

In the Datawarehouse, people are only considered to be in work when they are officially reported to the social security as such, which does not include unpaid volunteers or moonlighters. Besides, some employees are not registered with the Belgian social security system, particularly cross-border workers (living in Belgium, but working abroad).

Furthermore, the data for the Datawarehouse in Table 9.6 relates to the last day of the second quarter of 2000, while those of the Belgian LFS are annual averages. The number of employees according to administrative sources in the second quarter always lies slightly below the annual average in the Belgian LFS.

Below, we make the comparison between the Datawarehouse and the LFS on the basis of the ILO definition in the LFS, since it is the most usual way to determine the socio-economic position of the respondent. This focuses on employees and the data from the Datawarehouse is calculated as an annual average (i.e. the average of four quarters), which makes the comparison more clear-cut.

Table 9.7 Number of employees by age and gender in the LFS and DWH - Belgium, 2000

Employees	LFS (annual average)			DWH (annual average)			Difference		
	Total (n)	Men (n)	Women (n)	Total (n)	Men (n)	Women (n)	Total (%)	Men (%)	Women (%)
15-24 years	341,400	192,800	148,600	375,400	206,500	168,900	-9.1	-6.6	-12.0
25-34 years	1,047,100	563,700	483,400	948,200	512,000	436,200	10.4	10.1	10.8
35-44 years	1,079,500	592,900	486,500	986,900	546,900	440,000	9.4	8.4	10.6
45-64 years	972,400	601,100	371,300	925,500	569,200	356,200	5.1	5.6	4.2
Total	3,440,400	1,950,600	1,489,800	3,235,900	1,834,600	1,401,300	6.3	6.3	6.3

Source: NIS LFS, KSZ-DWH Labour Market (Processing Steunpunt WAV)

As expected, the LFS contains more employees than the Datawarehouse (+6.3%). However, important differences emerge relating to age. For example, among the 15 to 24 year olds, we note that the LFS contains fewer wage earners than the Datawarehouse. No suitable explanation is available for this. Possible explanations are the fact that proxy-respondents are more common among young people and they are less accurate in reporting minor jobs carried out by youngsters. This may result in fewer youngsters being considered as employed in the LFS. On the other hand, the administrative databases suffer from some 'contamination' from people with a temporary contract (including interim work): often, the date of the end of the contract is given incorrectly for these people resulting in the number of temporary wage earners being overestimated at the end of the quarter. Since young people are employed on temporary contracts more often than other age groups, their group is more affected by the problem, causing wage-earning youngsters to be overreported in the administrative databases.

Next, we look at the distribution of the wage earners by the activity sector in which they are employed. The same sector classification as before is used.

Table 9.8 Number of employees by activity sector according to LFS and DWH - Belgium, 2000

STILE sector	Description	LFS (n)	DWH (n)	Difference (n)	(%)
	ICT	**169,645**	**142,512**	**27,133**	**19.0**
1.1	Office accounting and computing machinery and electronic equipment	33,459	26,129	7,330	28.1
1.2	Telecommunications	88,935	80,179	8,757	10.9
1.3	Computer and related activities	47,251	36,205	11,046	30.5
	Agriculture, mining, manufacturing, utilities, construction	**952,316**	**812,541**	**139,775**	**17.2**
2.1	Agriculture, forestry, fishing	16,987	22,328	-5,341	-23.9
2.2	Mining, quarrying	7,451	4,003	3,448	86.2
2.3	Consumer goods	152,259	136,074	16,185	11.9
2.4	Wood, pulp and paper, printing, oil refining, chemical industry, rubber, plastics	197,822	156,781	41,041	26.2
2.5	Metals, machinery (not ICT)	277,831	229,454	48,377	21.1
2.6	Other manufacturing	69,150	57,640	11,510	20.0
2.7	Energy and water	34,214	26,595	7,619	28.6
2.8	Construction	196,603	179,667	16,936	9.4
	Trade, hotels, restaurants, transport, communication, financial intermediation, other services (excl. ICT, educational and research institutes)	**1,018,457**	**1,085,155**	**-66,698**	**-6.1**
3.1	Wholesale and retail trade, hotels, restaurants	453,143	509,646	-56,502	-11.1
3.2	Transport, storage, post, communications	211,865	170,600	41,265	24.2
3.3	Financial intermediation	147,430	128,274	19,156	14.9
3.4	Other services	206,018	276,635	-70,617	-25.5
	Educational and research institutes	**355,487**	**323,612**	**31,875**	**9.8**
4.1	Universities, educational institutions	344,702	313,199	31,503	10.1
4.2	Research institutes	10,786	10,413	373	3.6
	Other community services	**920,085**	**850,919**	**69,166**	**8.1**
5.1	Health activities	404,657	321,466	83,191	25.9
5.2	Other community services	515,428	529,452	-14,024	-2.6
5.3	Extraterritorial organisations	24,302	3,141	21,161	673.6
	Unknown	104	18,035	-17,931	-99.4
	Total economy	**3,440,395**	**3,235,914**	**204,481**	**6.3**

Source: NIS LFS, KSZ-DWH Labour Market (Processing Steunpunt WAV)

The deviations between the LFS and the DWH by sector are extremely large. Globally speaking, as we saw earlier, the LFS contains 6.3% more wage earners than the DWH. But that by no means applies to all sectors: only a few sectors have a deviation of 6.3% or less. Even if we only look at the large sector aggregates (indicated in bold in the table), we see that the differences are significant. On a more detailed level, the differences are even more striking. The only thing we can conclude from this is that both sources draw a very different picture of the distribution of wage earners and that we are actually talking about two different 'realities': the administrative reality and the subjective reality.

In the administrative source, the NACE code is allocated by the employer and it reflects the economic, judicial reality. In the LFS, the respondents (or proxy-respondents) themselves indicate the sector they work in, reflecting a subjective reality of which it is hard to determine on what (subjective) grounds it is based. Additionally, we saw that the quality of the reply by proxy-respondents deteriorates as the questions become more detailed. It would be safe to assume that information given by proxy-respondents on activity sectors is questionable.

9.3.2 The comparison of flows

The differences between the stocks by inference lead to differences in the flows in the labour market. Firstly, we look at the flow from one job to another (in other words, flows within the working segment) and secondly we focus on flows into and out of the working segment. Contrary to the comparative analysis of the stocks, we make use of the subjective questioning in the LFS (question 81) in order to determine the socio-economic position of the respondent at the moment of the survey. The reasoning behind this is that, in order to measure the socio-economic position of the respondent one year before the survey, we also have to make use of subjective questioning (questions 59 and 65) and those questions are drafted identically to the question into the socio-economic position at the moment of questioning (question 81). For the flows within the working segment, the Datawarehouse provides data of the four quarters of 2000, allowing us to calculate an annual average. For the flows into and from the working segment, we only dispose of the second quarter of 2000.

The differences between both sources with regard to the flows between jobs (16.1%) exceed those of the stocks (6.3%), but overall, these differences are not particularly dramatic. According to the LFS, approximately 235,800 people changed jobs over the past year in 2000, compared to a total of around 203,100 according to the Datawarehouse (Table 9.9). In any case, both sources indicate a same order of magnitude, both for stocks and for flows. As far as the age distribution is concerned, there are important differences: with the 25 to 34 year olds, the difference with respect to the flows is as much as 25%, whereas it amounts to 17% for 35 to 44 year olds. A possible explanation is the fact that the Datawarehouse does not measure internal mobility within the enterprise whereas the LFS, following the approach taken in this report, measures a change of function/position as mobility. It may well be that this internal mobility is more prevalent in the age groups 25-34 and 35-44, for example by the promotion or by people still looking out for the right job within the company.

When we carry out the distribution by sector of activity (distribution into STILE sectors on the basis of the two digit NACE code, the differences nevertheless become substantial, similar to the large differences observed with regard to the stocks. For example, it is striking that the LFS contains approximately 70% more job-to-job mobile people in the telecommunication sector (STILE sector 1.2) than the Datawarehouse, whereas large differences can also be found in the industrial sectors.

Since the differences in flows partly emanate from the differences between the stocks, it is useful to express job-to-job mobility as a relative measure, namely as a job-to-job mobility rate (flow/stock*100). Doing so reduces the differences between both sources. The LFS gives an inflow rate of 6.9% compared to the DWH's rate of 6.3%, which is a difference of 9.2% - this is (6.9-6.3)/6.3*100 - whereas the difference between both absolute numbers was 16.1%. The difference for the 25 to 34 year olds also becomes significantly smaller (13.3% compared to 25.2%). The distribution by activity sector reveals a similar trend: the differences decrease. The deviation with respect to the mobility rate in the *Telecommunications* sector is approximately 50%, while the deviation with respect to the absolute number of job-to-job mobiles was still 70%. In spite of this, the differences with regard to the mobility rate in the distribution by sector still remain very large.

Table 9.9 Job-to-job mobile employees and job mobility rate by gender, age and activity sector according to LFS and DWH - Belgium, annual average 2000

	Job-to-job mobile employees				Job-to-job mobility rate		
	LFS 2000 (n)	DWH 2000 (n)	Difference (n)	(%)	LFS 2000 (%)	DWH 2000 (%)	Difference (%)
Total	**235,800**	**203,089**	**32,700**	**16.1**	**6.9**	**6.3**	**9.2**
Men	140,500	121,049	19,400	16.0	7.2	6.6	9.1
Women	95,300	82,040	13,300	16.2	6.4	5.9	9.3
15-24 years	47,100	46,474	600	1.4	13.8	12.4	11.5
25-34 years	110,500	88,289	22,200	25.2	10.6	9.3	13.3
35-44 years	54,700	47,165	7,600	16.0	5.1	4.8	6.1
45-64 years	23,400	21,161	2,300	10.7	2.4	2.3	5.3
STILE sector							
1.1	.	1,314	.	.	.	5.0	.
1.2	6,400	3,809	2,600	67.8	7.2	4.8	51.3
1.3	7,800	6,007	1,800	29.2	16.4	16.6	-1.0
2.1	.	1,444	.	.	.	6.5	.
2.2	.	173	.	.	.	4.3	.
2.3	10,300	7,351	3,000	40.6	6.8	5.4	25.6
2.4	15,700	7,706	8,000	104.0	7.9	4.9	61.7
2.5	19,300	10,152	9,200	90.3	7.0	4.4	57.2
2.6	.	3,423	.	.	.	5.9	.
2.7	.	588	.	.	.	2.2	.
2.8	21,500	20,751	800	3.7	10.9	11.5	-5.2
3.1	42,200	45,565	-3,400	-7.4	9.3	8.9	4.1
3.2	18,200	15,336	2,800	18.6	8.6	9.0	-4.5
3.3	8,900	7,329	1,500	20.9	6.0	5.7	5.1
3.4	23,000	24,481	-1,500	-6.1	11.2	8.8	26.1
4.1	12,300	9,652	2,600	26.9	3.6	3.1	15.3
4.2	.	795	.	.	.	7.6	.
5.1	16,400	16,531	-100	-0.5	4.1	5.1	-21.0
5.2	21,500	19,960	1,500	7.7	4.2	3.8	10.6
5.3	1,100	128	1,000	793.6	4.7	4.1	15.5

Source: NIS LFS, KSZ-DWH Labour Market (Processing Steunpunt WAV)

However, not only are flows within the working segment important when researching mobility and the diffusion of knowledge/know-how, but also flows into and from the working segment play an important role. It is therefore interesting to see what both

sources teach us about these flows into and from the working segment. We try to keep the analysis simple and surveyable by a not too detailed distribution of the various socio-economic positions, making use of the global division between being in work or not.

Table 9.10 Mobility between work and no work according to LFS and DWH - Belgium, 1999-2000

LFS annual average	(nx1,000)		DWH 2 quarter	(nx1,000)	
Status 2000 / Status 1999	Work	No work	Status 2000 / Status 1999	Work	No work
Work	3,731	218	Work	3,516	244
No work	249	2,521	No work	311	2,225
Total	3,980	2,739	Total	3,827	2,470
Total population	6,719		Total population	6,297	
Total mobile people	467		Total mobile people	556	
Mobility rate	7.0		Mobility rate	8.8	
Difference (LFS-DWH)	**(nx1,000)**		**Difference (LFS-DWH)**	**(%)**	
Status 2000 / Status 1999	Work	No work	Status 2000 / Status 1999	Work	No work
Work	215	-26	Work	6.1	-10.6
No work	-63	296	No work	-20.1	13.3
Total	152	270	Total	4.0	10.9
Total population	422		Total population	6.7	
Total mobile people	-89		Total mobile people	-15.9	
Mobility rate			Mobility rate	-21.2	

Source: NIS LFS, KSZ-DWH Labour Market (Processing Steunpunt WAV)

We start from the previous observation that the populations of both databases differ: the LFS contains 6,719,000 people aged between 15 and 64, compared to the Datawarehouse counting 6,297,000; a difference of 422,000 people or 6.7% more in the LFS than in the Datawarehouse.[22] The difference lies with the number of people not in work (+10.9%) rather than with the total number of people in work (+4.0%): the Datawarehouse incorporates only part of the unemployed, namely those receiving benefits, whereas many retired people are also missing from it.

Due to the larger population, we also expect the LFS to contain more mobile people. However, it is immediately obvious that the LFS contains precisely fewer mobile people. The Datawarehouse counts 556,000 mobile people (into and from the working segment), compared to the LFS with 467,000 people, which is 89,000 people less (-15.9%) than in the Datawarehouse. Especially the flow from no work to work has been recorded as much smaller in the LFS (-20.1%). The number of mobile people around the working segment is estimated indisputably lower in the LFS than in the administrative databases of the Datawarehouse. Possibly, the memory effect may play a role here in the LFS, resulting in (relatively short) periods of unemployment or

22 The difference with Table 9.5 stems from the fact that the totals in Table 9.8 are dated at the end of the second quarter of 1999 and the totals of Table 9.9 date from 2000. The database on which this exercise about flows into and from the working segment is based starts from the population at the end of the second quarter of 1999 and it follows the population until the second quarter of 2000.

inactivity one year before the survey not being remembered. The effect, as underlined in section 9.1, will be even stronger with proxy-respondents.

Even if we account for a difference in the population by calculating a relative mobility rate (number of mobile in proportion to the entire population), the difference in mobility measured remains large: 8.8% in the Datawarehouse and 7.0% in the LFS. It is a difference of -21% - this is (7.0-8.8)/8.8*100 - which is even bigger than the difference between the absolute numbers (-15.9%).

Even without making a distribution by age, gender or activity sector, we still get a very different picture from both sources. We can assume that, when we look at these flows into and from work for various activity sectors, the differences will increase still further. It seems, therefore, that, even if the Datawarehouse does not cover the entire population, it is more suited to the measurement of flows at the detailed level: the LFS tends to underestimate the true quantity of flows.

9.3.3 Conclusion

From these analyses, we can conclude that the differences between the LFS and the DWH with relation to the *stocks* and *job-to-job mobility flows* generally remain fairly limited. But when we make a distribution by activity sector, the differences mount up. It seems as if the variable 'activity sector' reflects a different reality in both sources and furthermore that the quality of this variable in the LFS is dubious, particularly for certain groups like the youngsters where many proxy-respondents are used.

With relation to the *flows into and from the working segment*, the differences are greater, even on a very general level (global difference between work and no work; no distribution by age, gender or sector). For analyses regarding the inflow into and outflow from the working segment for various activity sectors, the LFS is not the most suitable instrument in the light of the substantial deviations from the administrative data.

Chapter
10

Conclusions and recommendations

This report has explored the possibilities to use the EU LFS and the Belgian Datawarehouse for:
- determining flows within the ICT sector and between ICT and other branches by regrouping the economic destination sectors of ICT personnel into broad categories;
- looking at the skills base of the inflows of younger people into the ICT sector;
- linking this to more general measurements of employment growth in the ICT sector, by gender, age or type of occupation;
- describing the ICT sector in Belgium in terms of its personnel.

The conclusions and/or recommendations to this report are relevant at a number of levels. The first, the statistical results, which concern stocks of ICT workers in Europe and detailed stocks and flows in Belgium, can provide useful information to help judge the progress that is being made towards key EU policy objectives including those set out at the Lisbon and Barcelona summits. The second relates to the quality of the results obtained, most notably for mobility flows (in the ICT sector) using the EU LFS data, and puts forward suggestions for certain improvements that could be made to ameliorate the data quality and comparability, whilst establishing limitations to the type of analysis that could be performed.

10.1 ICT sector employment, growth and mobility in Belgium and the EU

10.1.1 The Belgian Datawarehouse

Using the Belgian Datawarehouse, analysis of the inflow into a new wage-earning job has taught us that the proportion of wage earners which are new to their job in *Office accounting and computing machinery* and in *Telecommunications* lies below that of the average sector, and above average in the *Computer and related activities*. For *Office accounting and computing machinery* and *Telecommunications*, it is primarily due to the lower inflow from unemployment and the inactive; for *Computer and related activities*, the higher inflow from another wage-earning job plays a definite role. Just as in other sectors, the inflow into ICT is very high among youngsters. The inflow from inactivity, in this case from the education system, is particularly significant here.

With regard to the outflow from a wage-earning job, we can more or less draw the same conclusion: the outflow in *Office accounting and computing machinery* and *Telecommunications* lies below that of the average sector, whereas the outflow in

Computer and related activities exceeds it. For *Computer and related activities*, the high outflow to another job again plays an important role.

The outflow is particularly high among youngsters, more specifically the outflow from the wage-earning segment is high. However, we see that in ICT the outflow among youngsters is still far below the average, also in *Computer and related activities* which overall has a higher outflow. Work experience in ICT seems to give youngsters an important advantage in the labour market. For *Computer and related activities,* we therefore see that the outflow from a wage-earning job in the older age groups (particularly for those aged 35 and over) lies above the average of other sectors, primarily due to the high outflow towards another wage-earning job.

If we juxtapose the inflow and the outflow, it is immediately obvious that the wage earners in *Office accounting and computing machinery* and *Telecommunications* have a lower level of mobility, resulting in a more limited mobility of knowledge and skills around those sectors, while the wage earners in *Computer and related activities* register a high level of mobility leading to knowledge and skills being extremely mobile in the sector.

Furthermore, we note that *Telecommunications* and *Computer and related activities* are among the few sectors where more new wage earners flow in than out. This positive balance nevertheless only applies to youngsters and to the 25 to 34 year olds. Among the 35 to 44 year olds and the 45 to 64 year olds, the balance is negative all round. It signifies that ICT sectors may well have a large inflow of 'textbook knowledge' but they also have a significant outflow of experience and know-how.

The analysis of job-to-job mobility took an in-depth look at the group of wage earners changing to a different employer. Again, it clearly transpired that *Computer and related activities* has a deviating mobility pattern. Where this sector registers a job-to-job mobility rate that is well above the average for all sectors - particularly its subsectors *Hardware* and *Software consultancy* - *Office accounting and computing machinery* and *Telecommunications* have a lower job-to-job mobility rate. Here, too, we establish that the youngsters and the 25 to 34 year olds have particularly high mobility rates.

In all ICT sectors, the proportion of job-to-job mobile wage earners remaining within their own 'STILE' sector furthermore remains below the average. Particularly in *Office accounting and computing machinery* and *Telecommunications*, the proportion is very small. A large proportion of the job-to-job mobile in the ICT sector consequently not only changes jobs, but also moves to another 'STILE' sector.

With regard to the flows between sectors, we can conclude that sectors give and take. The ICT sector particularly has a 'trade-off' relationship with the *wholesale of machinery, equipment and supplies,* with *business and management consultancy activities* and *architectural and engineering activities and related technical consultancy.* Furthermore, *Office accounting and computing machinery* also finds 'receivers' and 'suppliers' in the *manufacture of machinery and equipment* and the *manufacture of electrical machinery and apparatus.* For *Telecommunications,* it is the *miscellaneous business activities* and the *administration of the State and the economic and social policy of the community.*

10.1.2 The EU LFS

Using the EU LFS to provide cross-country comparisons of growth in the ICT sector as well as the changing composition of the workers in the sector seems to be possible. This is the strong advantage of the LFS: that it can provide a whole variety of information on the characteristics of the individuals. But, until a greater amount of data

at the three digit level of NACE is provided to Eurostat, the proviso that the definition of ICT used deviates from that followed by the OECD remains. We have seen that this artificially inflates (sometimes marginally, sometimes to a greater extent) the size of the ICT sector by including non-ICT sectors such as *postal services*.

That said, it is also worth recognising the problems that result from analysing sector and occupation data at too detailed a level and the consequences that this can have, especially for analysis at the international level. Workpackage 3 of the STILE project, on NACE and ISCO classifications of *e*Business and *e*Workers, has been dedicated to such issues and has highlighted the differences in coding procedures, ultimately leading to different results according to country, seemingly exacerbated at the more detailed level of the nomenclature (see Bertin et al., 2004).

Using the two digit definition of the ICT sector, the following more general trends can be highlighted. Ireland has by far the highest proportion of ICT employment-intensity at 7.6%. Other leading countries are Switzerland, Finland, Sweden, the UK and Denmark, all with over 5.5% of total employment in the ICT sector.

Though there are country differences, the ICT sector in Europe can be characterised by its male dominated nature. On average, only one in three ICT jobs is held by a woman. Furthermore, growth in the number of ICT sector jobs has generally been higher for men than for women, which means that if these trends continue, what is already a male dominated sector will become increasingly so in the future.

In the EU-25, more than one in every three jobs in the ICT sector is carried out by someone in the 25-34 year old age bracket and 70% of all ICT jobs are held by people aged between 25 and 44.

Comparing the distribution of ICT employment by gender and age with total employment in the various Member States serves to underline the degree to which ICT attracts a younger work force. For total employment, 29% of working men aged 25-64 at the European level fall into the 25-34 year old age bracket (in the ICT sector 25-34 year olds account for 36% of jobs). The same proportion holds true for 25-34 year old women.

Just as in the European economies generally, ICT employment is geared towards the service sector to a greater extent than manufacturing. There has also been an increasing level of service orientation to ICT sector employment between 1998 and 2002.

Already between 1998 and 2002, Europe has seen the proportion of its employed population with a tertiary level education increase by 2% from around 23% to 25%. But this growth has been even more evident in the ICT sector. First of all it is more likely that an ICT sector worker in Europe will be tertiary educated (35% of people in the ICT sector have a tertiary education). Second, the ratio of tertiary to non-tertiary educated workers has been increasing at a faster rate in the ICT sector than it has in the economy as a whole. This implies that there is some combination of a higher demand for highly skilled workers in the ICT sector than overall and a higher supply of tertiary educated workers to the ICT sector due to the attractiveness of the sector.

Far from being a sector that is characterised by job insecurity, the proportion of employees on a temporary contract in the ICT sector in Europe is below the level of the overall economy. Furthermore, over time, the gap has been increasing: the proportion of all employees with temporary contracts was 8.5% in 1998, growing to 9.4% in 2002.

Whilst the proportion of people working part-time has generally increased in Europe between 1998 and 2002, in the ICT sector it has fallen. Though this provides no indication of when the hours are worked (i.e. late, night, weekends) and therefore the flexibility of the sector, it does at least suggest that the ICT sector is more demanding in terms of the number of hours it requires from its workers.

At the European level, even though entrepreneurship has increased marginally in the ICT sector between 1998 and 2002 (from 6.8% to 7.2%) it still remains at less than half of the level evident for the overall economy, which itself has fallen over the same time period (15.3% in 2002). In fact, there is not one country where entrepreneurship is higher in the ICT sector than overall, either in 1998 or 2002.

10.2 Methodological and quality issues

10.2.1 Initial remarks

The importance of research into mobility in the labour market has sharply increased over the last few years and many researchers have homed in on the issue. The most important resource for studying mobility in the labour market was (and still is) the Labour Force Survey which gauged the labour market situation of respondents one year before the time of the survey.

In Belgium also, mobility research has been based mainly on the information available in the LFS. Recently, the Datawarehouse Labour market has become an important new source at the disposal of researchers. Experiences in the Scandinavian countries demonstrated that administrative databases have considerably widened the scope for labour market research. More and more countries, including Belgium and Germany, have opened up their administrative databases for research. There is an increasing awareness that they provide significant opportunities for labour market research.

With the analyses in the context of STILE, we wanted to explore the possibilities of this new database to assess the current and future value of the LFS and of administrative data for research into mobility in the labour market. More specifically, we tried to gauge the value of both sources for research into the mobility of employees in the ICT sector in order to gain a better insight into the knowledge flows into and around the ICT sector as well as of the distribution of Information Society Knowledge. This was done by an in-depth analysis of the level of interaction between the ICT sector and other branches of the economy on the basis of the Datawarehouse on the one hand, and a global comparison of both sources with regard to stocks and flows in and around the labour market on the other hand.

10.2.2 The EU LFS

If we first consider what we have learnt about the (EU) LFS, it is evident that whilst, in theory, it offers the means to calculate indicators on not just mobility in the ICT sector, but also the characteristics of the individuals that are mobile, the practical application of these methods often gives unsatisfactory results.

Though data availability is better when mobility is measured for the total economy, when the ICT sector is differentiated, the number of countries for which data is available is just 17. This can be due to an absence of the necessary variables to calculate mobility (i.e. working status in the previous year or length of time with the current employer) or that the sample becomes too small to meet each country's reliability requirements. The availability of the data decreases significantly when looking at mobility in the ICT sector by gender.

When focus is placed on the inflows to the ICT sector, a significant number of cells had to be suppressed because the reliability of the data did not meet the requirement guidelines provided by the Member States. Further country data is unavailable because the questions are not reported or surveyed at the national level. This means

that, in all, indicators for only 40% or 12 countries could be presented in 2001. Assessing outflows from the ICT sector to another sector of activity also appears difficult.

Such coverage can only lead to the conclusion that for such detailed user requirements, the EU LFS is an unsuitable source of data. The availability of indicators is strongly affected by the quantity of people that fall into the selected category. This has an important bearing on the interpretation of the results and the degree to which the EU LFS can and should be used as a data source for such detailed ICT worker profiles. It is also worth underlining that this quality consideration is not only dependent on the make-up of the ICT sector by country, but also on the capacity of the Labour Force Survey to capture the information: fewer problems are encountered where the ICT sector is more prevalent and where national LFS samples are larger.

These results impact upon the measurement of mobility in the ICT sector specifically, principally due to the size of the sample which falls into the particular criteria. The most obvious impact is that the extrapolations of these sampled populations often fail to meet the reliability thresholds for publication of data: there are simply to few people. However, further analyses have underlined some of the issues encountered for the measurement of mobility in general.

For example, measuring mobility using data available from retrospective questioning relies on information being provided after the actual event. In event history analysis, studies have shown that the relationship between the accuracy of recalled events and the period of time elapsed is complex. That while, in general, the greater the period of time elapsed the less likely it is that events will be recalled correctly, certain salient events may be more likely to be recalled correctly over long time periods, whereas others can suffer from recall bias, even over relatively short periods.

Apart from retrospective questioning affecting the quality of the results, though the EU LFS is a relatively harmonised source of data, its list of questions is provided as a guideline only to the Member States. In practice this means that the questions may not be formulated in exactly the same way in different countries, which can lead to different results. Another methodological issue concerns the definition of the firm (establishment or enterprise) that is followed in each of the national Labour Force Surveys.

Following the proxy-method of calculating mobility avoids the quality questions that result from using retrospective questions and basing estimates on what is often a very small sample of individuals. At the same time, though this growth is essentially equivalent to *net flows* and, with longer time series, provides some interesting indications of the changing characteristics of workers in the ICT sector, it does not satisfactorily answer the detailed questions concerning inflows, outflows and mobility.

10.2.3 The Belgian Datawarehouse

The first analyses from the Belgian Datawarehouse on the other hand have clearly illustrated the possibilities but also the limitations of administrative data for mobility research in general and, more specifically, for research into knowledge flows into and around the ICT sector.

The main advantage of the DWH is its exhaustive character which requires no extrapolation, enabling a far-reaching breakdown of variables. This is particularly crucial for a detailed demarcation of the ICT sectors. But other advantages include the non-occurrence of quality loss due to data affected by memory distortion and proxy-respondents, clear objective definitions of socio-economic positions and the activity sectors and the possibility to assemble long-term data on a quarterly basis.

The main disadvantage of the DWH is the absence of a variable giving insight into the knowledge and skills of the population, for example the educational attainment. This makes it impossible to define the transfer of an employee in terms of high or low knowledge flow and it forces us to assume that any employee transfer involves a certain transfer of knowledge. Another disadvantage is the existence of 'administrative contamination', for example by purely administrative changes like employers' codes or administrative delays. This shortfall is nevertheless partly remedied and will be solved in the future by the use of a unique ID-number for establishments. Lastly, a proportion of the population is missing from the Datawarehouse. But since it largely concerns inactive people, for example pensioners, this drawback is less dramatic for research into knowledge flows in the ICT sector.

In general, though, we can safely say that the strengths of the Datawarehouse correspond to the weaknesses of the LFS and, inversely, that the weaknesses of the Datawarehouse correspond to the strengths of the LFS. An important advantage of the LFS, apart from the opportunity it creates to make international comparisons, is the information it contains about the educational attainment of respondents; an important drawback is the lack of a reliable meticulous detailing of the NACE code because of its sample character, the use of proxy-respondents and the subjective definition of activity sectors.

10.2.4 Closing statement

An aim of this report was to evaluate the extent to which the various Labour Force Surveys conducted in the Member States could act as a source of information on ICT sector mobility and the characteristics of employment growth. However, researcher and user needs are becoming ever more demanding and it is only natural that at some point the realities of the statistical system, which include resource constraints, burden and confidentiality issues, will not be able to cope with these demands.

One of the main advantages of using the EU LFS as a source is that it provides relatively harmonised and internationally comparable data. This could offset to some extent the misgivings that result from the relatively broad definition of ICT that has been adopted, itself so that a greater number of countries could be analysed. However, when such widespread suppression of data becomes necessary as with the indicators on mobility in the ICT sector, one has to question the value of using the EU LFS for the purposes of providing a comprehensive picture of mobility in the ICT sector in the European Union.

10.3 Recommendations

As this report has highlighted, though there seems little scope to provide recommendations to improve the use of the EU LFS for measuring mobility in the ICT sector, certain modifications could at least be made to the EU LFS to improve the measurement of total mobility. Though there are no ready-made solutions to turn the LFS into a more suitable instrument for measuring the mobility of Information Society Knowledge, a few avenues are available to improve the general quality of the data in this respect.

One way could be by following the panel approach. The disadvantage of this method is that if a measurement of mobility between one year and the next is desired, then because respondents only participate in the survey for a limited period of time, the number of people for which data is available at both points will be small and not necessarily representative of the economy as a whole. Increasing the number of

people in the panel is possible by concentrating on mobility between quarters, rather than between years, but this needs to be offset against the lower number of people that are likely to change jobs during a three-month period compared to a year.

Furthermore, restricting the use of proxy-respondents would probably increase the accuracy of the results. After all, research has indicated that the quality of replies given by proxy-respondents falls sharply with regard to detailed questions. However, if anything, recent trends in Member countries have been to move away from personal interviewing and towards telephone interviewing (CATI: Computer Assisted Telephone Interviewing), which does not necessarily improve the likelihood of obtaining direct responses. The effects on data collection costs would also be significant, at a time when national statistical institutes are facing increasing budgetary pressures.

A more practical, realistic and implementable recommendation would be to make the coding of the activity sectors a much more objective procedure. For this it would be necessary to broaden the questioning on the sector of activity by asking for more details on the activity of the establishment/enterprise the respondent works. Another STILE study deals with the subject of problems related to the coding of sector of activity and occupation data for ICT (see Huws et al., 2004).

Efforts to harmonise the use of the establishment level, rather than a mixed use of enterprise or establishment level, for the measurement of when someone began working for their current employer would not only improve the comparability of the data, but would also ensure a more accurate measurement of actual job mobility.

The most comprehensive solution for many of the drawbacks discussed is nevertheless for both sources to underpin each other with their respective strengths. The advantages of both sources are clearly complementary. By linking the LFS data to administrative sources, for example like the Belgian Datawarehouse, we could effectively kill two birds with one stone. The Datawarehouse could be complemented with data on educational attainment and the LFS data enriched with panel data regarding the labour market situation.

In future, the significance of administrative data can only grow by the steady growth of ICT applications by public authorities and because an increasing amount of information is recorded with regard to the labour market and education. It is abundantly clear that the possibilities of administrative databases for quantitative analysis are unsurpassable. Then again, the strength of surveys like the LFS resides in the fact that they can obtain more qualitative information that can complement the quantitative information contained within administrative databases. Qualitative data forms the indispensable motor of explanatory labour market research. Within the framework of the SWOT analysis, this is an opportunity for the LFS. A case in point is the cause of mobility. The detailed analysis on sectoral flows in the ICT and other sectors in Belgium revealed varying degrees of intrasectoral mobility and raised questions about the transferability of skills and the attractiveness of the sector. This was a question that cannot currently be answered, but which, with slight modification to the coverage and the wording of the responses could be. It is also of crucial importance for research into the causes of mobility. For research questions such as the topic of this report, the future of surveys like the LFS therefore lies in the collection of qualitative information, ideally linked to the administrative databases to make for a comprehensive research instrument.

Technically, this could be carried out by using the ID-numbers of individuals in the administrative database and linking them with the information available for the same ID-number in the Labour Force Survey. It goes without saying that this information should then be anonymised before being released to anyone for the purposes for research. Extra security controls could also be implemented, such as is currently the

case concerning the confidentiality of data at Eurostat, to further ensure that it respects individuals rights to privacy.

This is a possibility open only to those countries for which, first, there is usable administrative data and, second, public opinion on the use of personal data is sufficiently open. Being an extremely sensitive subject in some countries, respecting controls and other safeguards such as anonymisation may not be enough to ensure even a restricted use.

Which leads to a further question. If the data from administrative databases is to be used in a comparative perspective, then what is its international comparability? The EU LFS has a long history, which it has used to introduce steady improvements in the comparability of the data, and still certain problems remain. On the other hand, the purpose of administrative data, while it provides very detailed information, is not research. Should efforts be made to further collect and compare administrative data in an international context, it could be interesting to have an idea of its comparability, though conducting such an exercise would be an extremely arduous affair.

Annexes

Annex 1 / Country reports

This annex provides 29 country reports built up using the EU LFS data. To the extent that data is available, the structure of each country report is identical: composed of ten graphs and some key figures, each indicator has a benchmark provided. This may compare the EU-15 or EU-25 averages, compare the situation for the ICT sector with the overall economy or indeed do both. Due to data availability and reliability, the country reports first and foremost provide a contextual background to research on mobility in the ICT sector.

The following indicators are provided:[23]
- activity rate in % - 1994-2002;
- unemployment rate in % - 1994-2002;
- ICT employment as a % of total employment - 1994-2002;
- distribution of ICT employment by age and gender - 2001;
- highly qualified employment as a % of total employment in ICT and overall - 1995-2002;
- ICT manufacturing and services employment - 1995-2002;
- self-employment as a % of total employment in ICT and overall - 1994-2002;
- part-time employment in % in ICT and overall - 1994-2002;
- employees with a temporary contract as a % of total employment in ICT and overall - 1994-2002;
- national job-to-job mobility rate in ICT and overall - 1994-2002.

23 Methodological notes organised first according to indicator and second according to country are provided at the end of the country reports. These methodological notes also provide information on the EU LFS, the various definitions and also how the indicators are calculated.

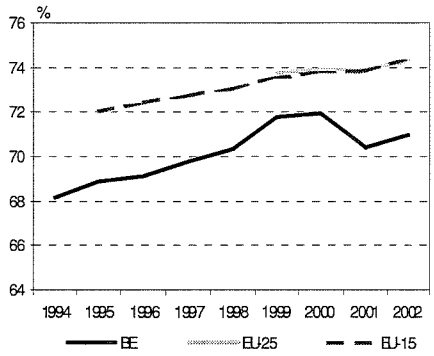
Belgium

Belgium has seen an increasing activity rate, falling unemployment and a near steady rise in the prominence of ICT jobs as a proportion of total employment (5% in 2002).

The ICT sector is male dominated - in 2001 over 76% of ICT jobs were held by men - and skewed towards the young for both men and women: 25-34 year olds accounted for 33% of all ICT sector jobs.

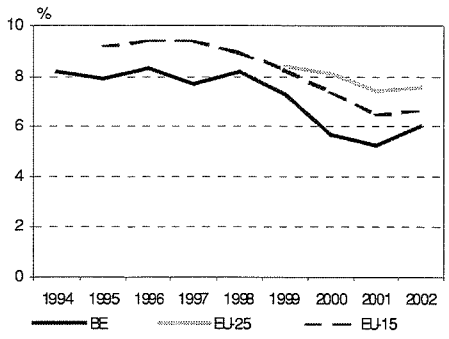
Jobs in the ICT sector in Belgium are more likely than the European average to be carried out by the tertiary educated (2.2% of total employment in Belgium and 1.5% in the EU-15).

Activity rate in % - 1994-2002



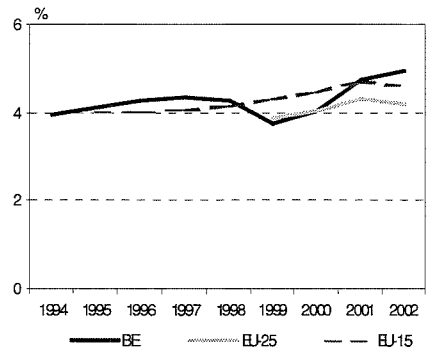
Source: EU LFS

Unemployment rate in % - 1994-2002



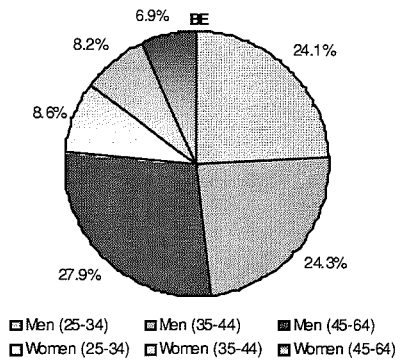
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



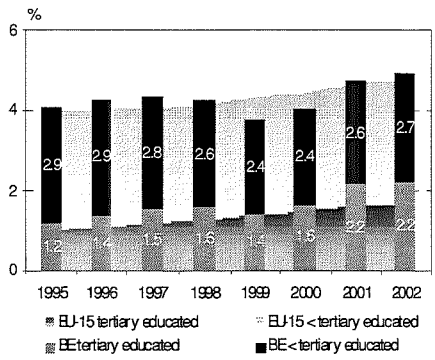
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



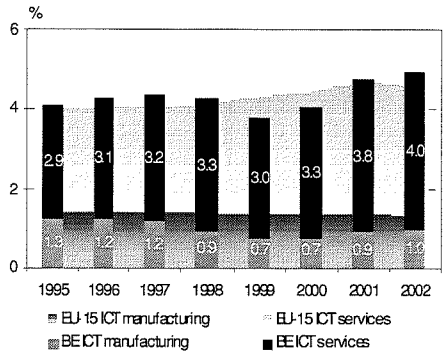
Source: EU LFS

Highly qualified employment in ICT 1995-2002



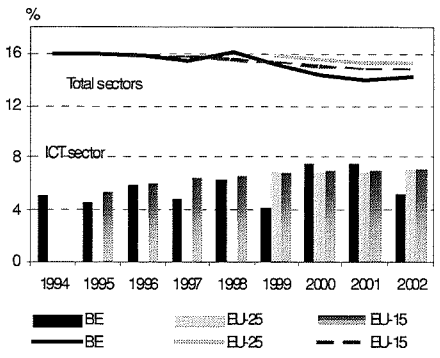
Source: EU LFS

ICT manufacturing and services employment -1995-2002



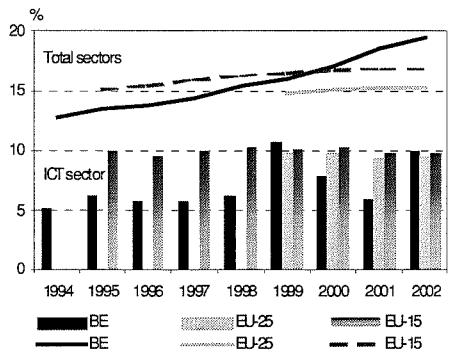
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



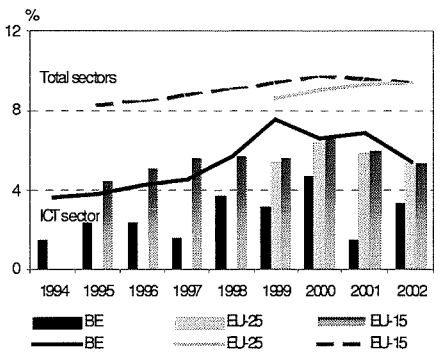
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



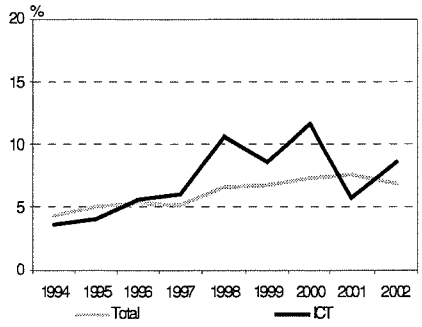
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

The ICT sector in Belgium is principally service-oriented, and to a higher degree than is the European average.

Workers are less likely to be self-employed in the ICT sector than in the economy in general (5% compared with 14% in 2002). The same can be said for part-time employment and the existence of temporary contracts, with the former showing an increase between 1994 and 2002.

While job mobility increased in both the ICT sector and overall, starting at a rate slightly lower than for the economy overall, mobility in the ICT sector in Belgium exceeded the national average by 2002 (9% compared with 7%).

Czech Republic

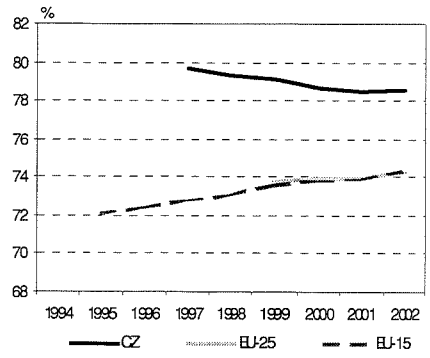
The activity rate in the Czech Republic has fallen slightly in the period from 1997 to 2002, though it remains 4% above the European average. Despite this, employment has grown over the entire period (not in graph).

Employment in the ICT sector has risen marginally, representing 4% of total employment in 2002, though it remains below the EU-25 average.

There is a near parity between the proportion of men and women working in the ICT sector, though men are more likely to be aged 25-34 (21%) and women 45-64 (21%).

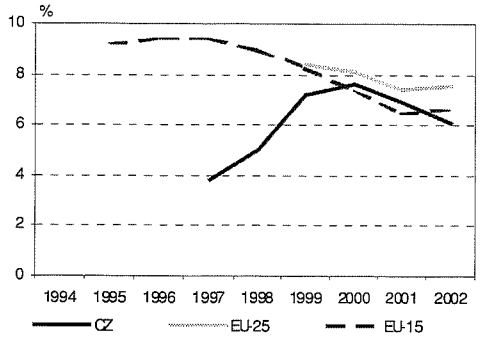
The Czech Republic has a below average level of tertiary educated people working in ICT.

Activity rate in % - 1994-2002



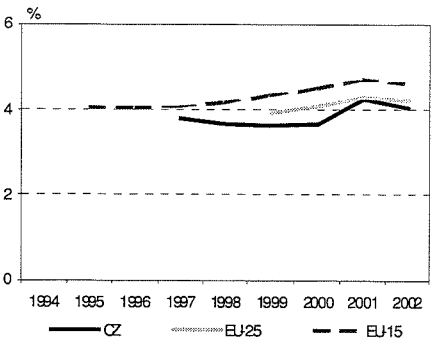
Source: EU LFS

Unemployment rate in % - 1994-2002



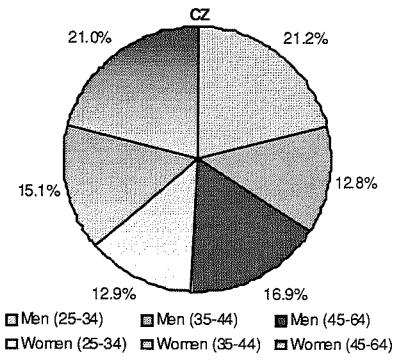
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



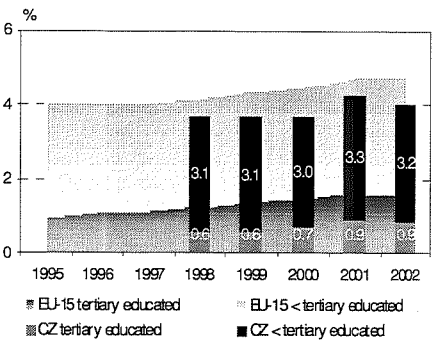
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



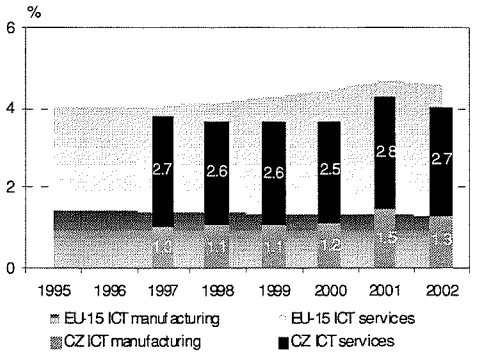
Source: EU LFS

Highly qualified employment in ICT 1995-2002



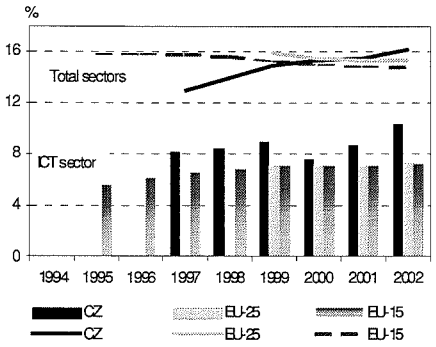
Source: EU LFS

ICT manufacturing and services employment -1995-2002



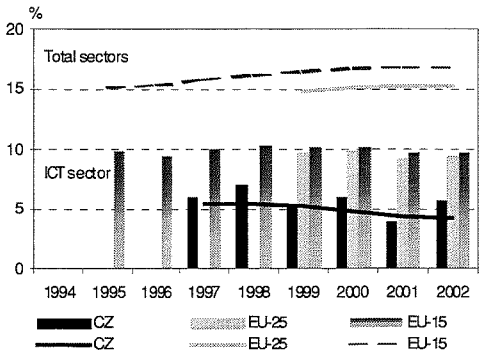
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



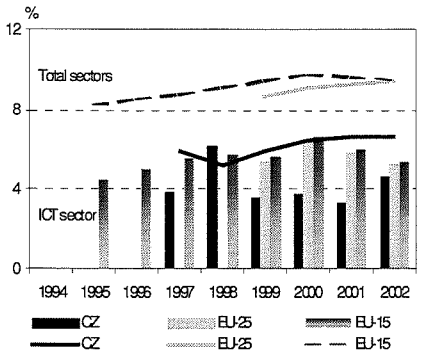
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



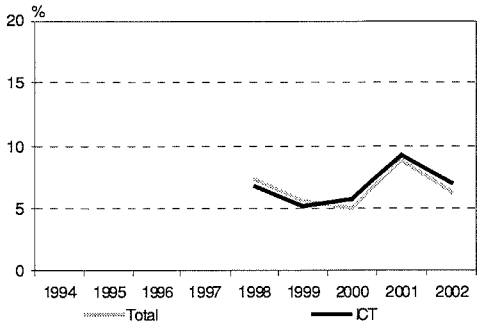
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

Though still service-oriented the ICT sector in the Czech Republic was more geared to manufacturing than the EU-15 generally (33% of all ICT employment compared to 29% in the EU-15).

ICT workers are less likely to be self-employed than in the economy overall, however in the Czech Republic self-employment in the ICT sector is more prevalent than in Europe generally. Part-time employment and temporary contracts are generally lower than the European average for both ICT and overall.

ICT and total job-to-job mobility follow a similar trend over the observed period with ICT mobility being slightly higher (7% in 2002 compared to 6% for the total economy).

Denmark

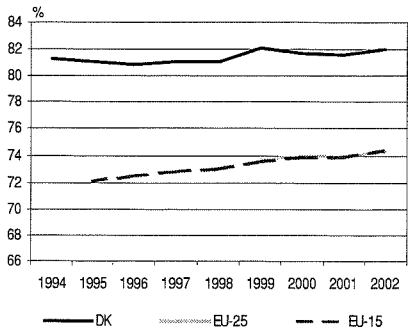
The activity rate in Denmark has been relatively stable and, in 2002, was 8% above the EU level. Unemployment has fallen to around 4%. The prevalence of ICT has increased through most of the time period, rising from 4% of total employment to nearly 6% in 2002.

Men account for two thirds of all ICT employment - a quarter of total ICT employment in 2001 was accounted for by male 25-34 year olds. The same age group account for the largest share in female ICT employment at 13%.

Though 1.8% of the employed in Denmark are tertiary educated ICT workers, compared to 1.6 for the EU-15, the tertiary educated represent around a third of all employed in both Denmark and the EU.

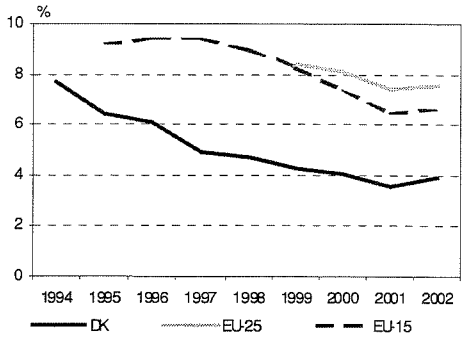
Source:

Activity rate in % - 1994-2002



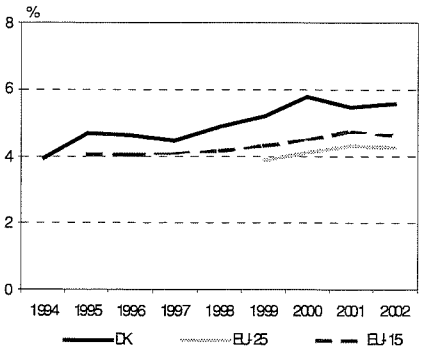
EU LFS

Unemployment rate in % - 1994-2002



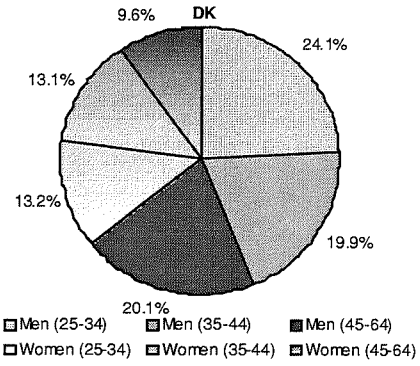
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



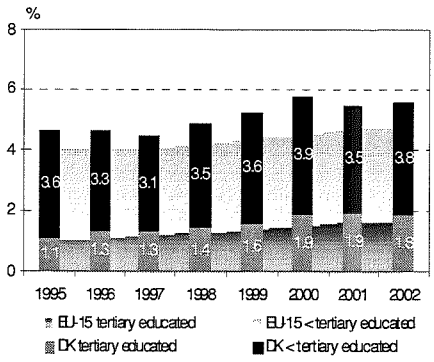
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



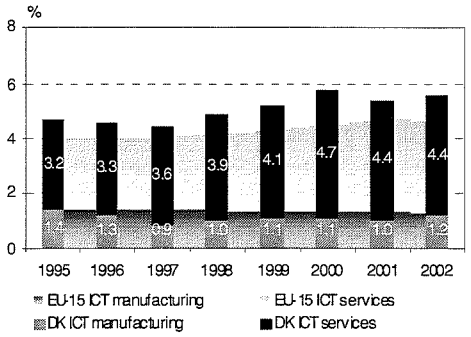
Source: EU LFS

Highly qualified employment in ICT 1995-2002



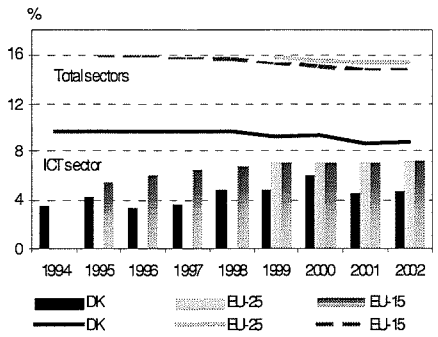
Source: EU LFS

ICT manufacturing and services employment -1995-2002



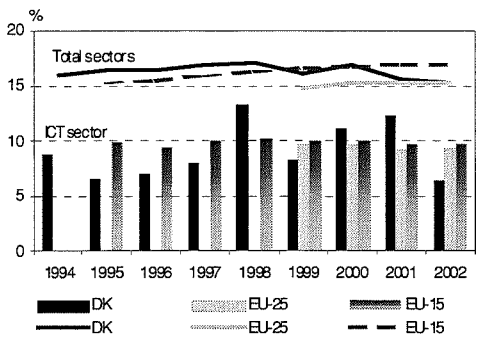
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



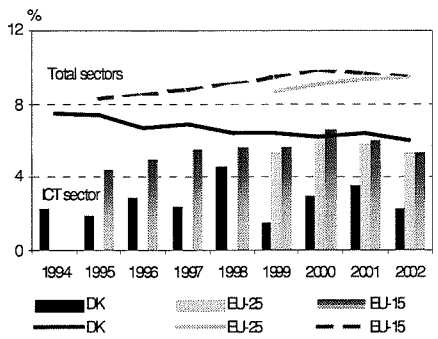
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



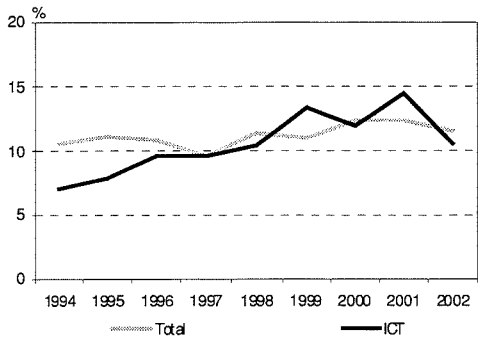
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

The ICT sector in Denmark is heavily skewed towards the service sector, accounting for close to 80% of all ICT employment in 2002.

The propensity to be self-employed is lower in the ICT sector than for the economy overall and indeed is relatively low compared to the European average in general.

ICT workers are also less likely to be working on a temporary contract (though the difference at the national level between ICT and overall has reduced between 1994 and 2002).

Job-to-job mobility in ICT has increased to a greater extent that overall mobility - both represented more than 10% in 2002.

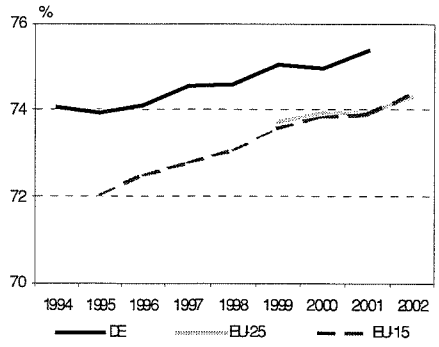
Germany

Though the activity rate in Germany is above the EU average and has been rising, this is partly accounted for by the high level of unemployment. Between 1995 and 2002, the share of ICT employment amongst total employment has increased at a similar level to that of the EU-15.

In 2001, men accounted for around two thirds of ICT employment. For both men and women, however, the most dominant age groups were the 35-44 year olds.

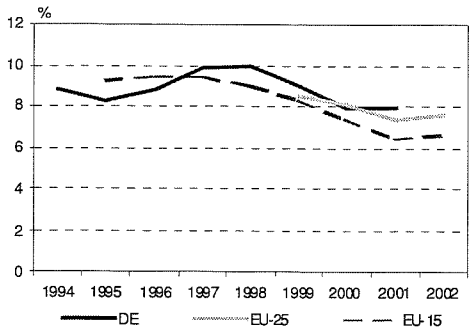
The tertiary educated accounted for around a third of total ICT employment in 2002, the same as in the EU-15 generally. For both Germany and the EU-15, the propensity for the tertiary educated to be working in ICT has increased over time at the expense of the less qualified.

Activity rate in % - 1994-2002



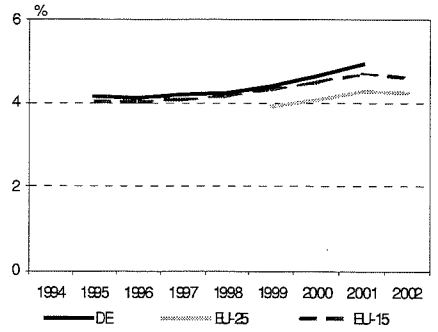
Source: EU LFS

Unemployment rate in % - 1994-2002



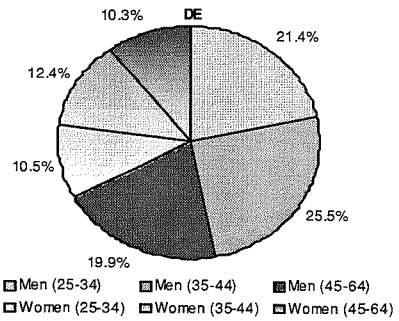
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



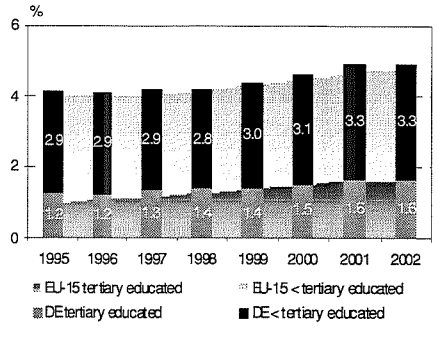
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



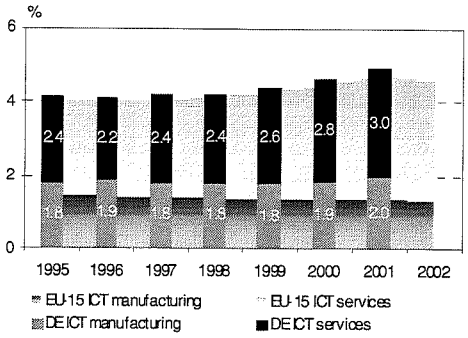
Source: EU LFS

Highly qualified employment in ICT 1995-2002



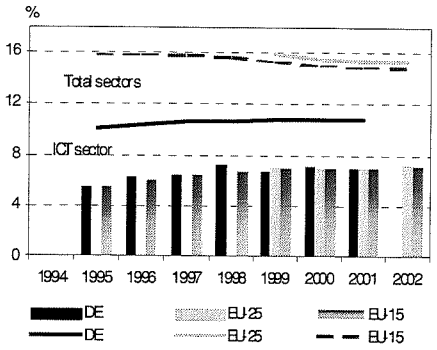
Source: EU LFS

ICT manufacturing and services employment -1995-2002



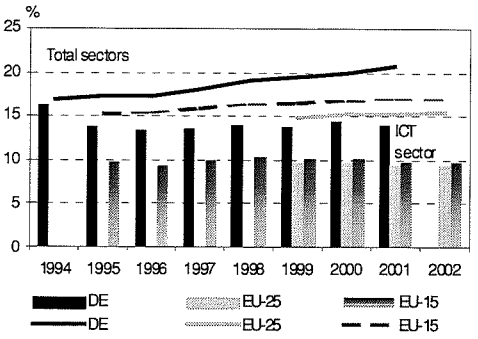
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



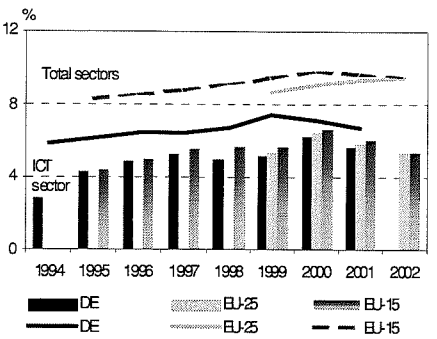
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



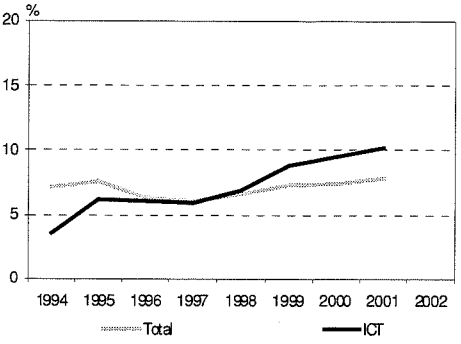
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

Whilst, in Germany, the weight of the manufacturing sector in general is relatively high, the ICT manufacturing sector accounts for an even greater proportion of employment (40% of total ICT employment in 2001).

Self-employment, lower than the EU average overall, is nevertheless on a par when it comes to ICT.

Part-time employment is high compared to the EU in both the ICT sector and overall, to a considerable degree accounted for by women (not in graph).

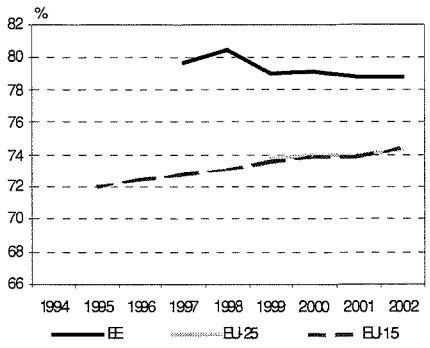
By 2001, 10% of people working in the ICT sector had changed jobs the previous year compared with 8% for the overall economy. In 1994, meanwhile, people in the ICT sector were less mobile than in the economy overall.

Estonia

The activity rate in Estonia is relatively high compared to the European average, though this is partly accounted for by the high rate of unemployment. The ICT sector has increased marginally up to 2002, though was around 1.5% lower than the EU-15 average at a moderate 3%.

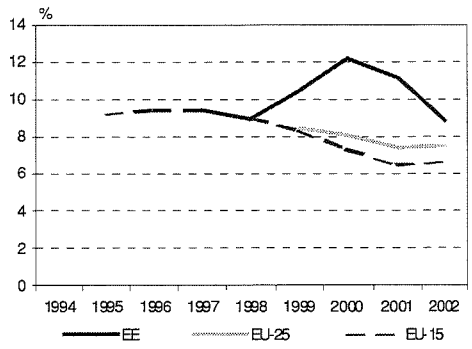
People employed in the ICT sector in Estonia are far more likely than the average to have achieved a tertiary education.

Activity rate in % - 1994-2002



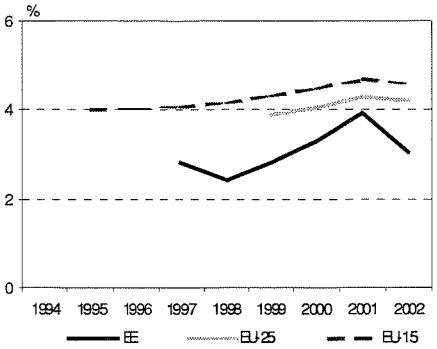
Source: EU LFS

Unemployment rate in % - 1994-2002



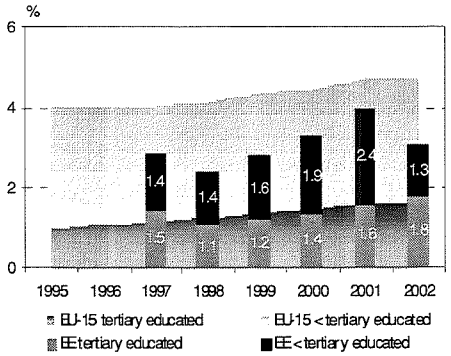
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



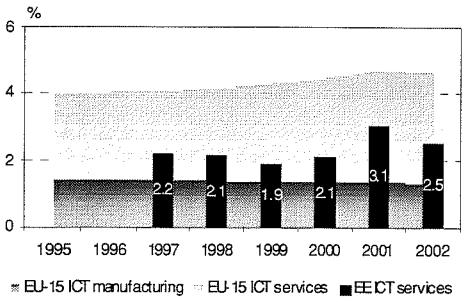
Source: EU LFS

Highly qualified employment in ICT 1995-2002



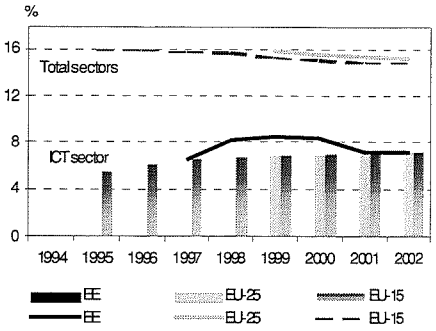
Source: EU LFS

ICT manufacturing and services employment -1995-2002



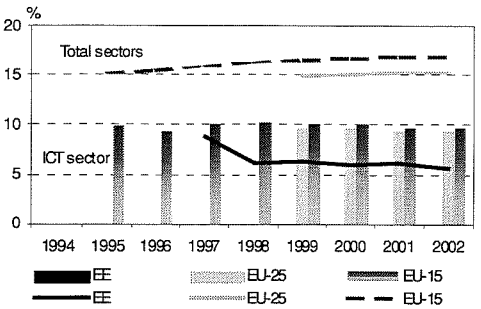
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



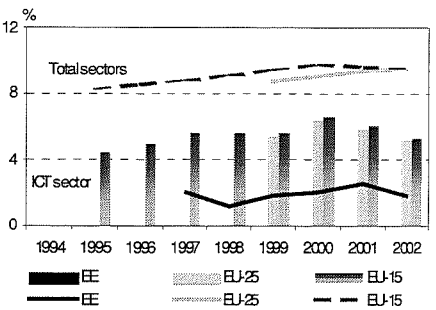
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



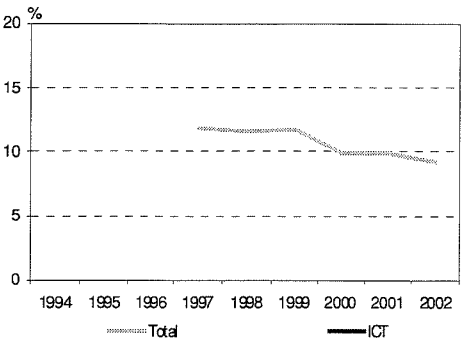
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

Reliable reporting of most sub-groups in the ICT sector is not possible in Estonia. Looking at the overall economy, however, self-employment is far less prevalent in Estonia than is the European average.

The same is true for part-time employment and also the proportion of people that are on temporary contracts.

Job-mobility, which was at a reasonably high level in 1997, has fallen in most years to 2002, where it was just under 10%.

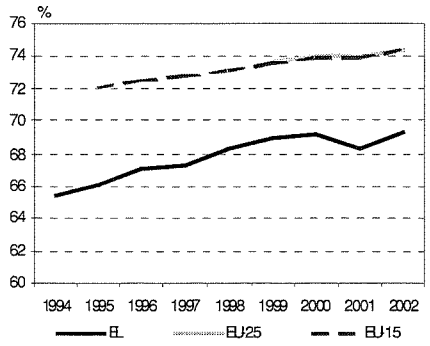
Greece

The activity rate is some distance below the EU average. In contrast to the EU, the unemployment rate in Greece has risen between 1994 and 2002.

The share of ICT in total employment has risen marginally but still only represented 2% of total employment in 2002.

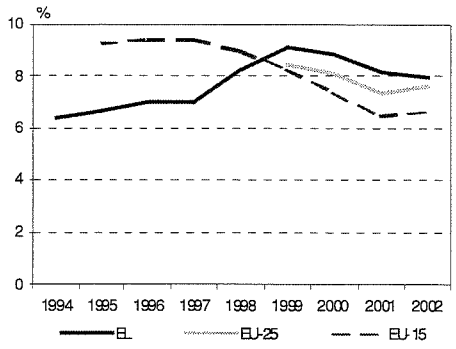
Around 72% of those employed in the ICT sector are men, with 28% aged 45-64 and 44% aged 25-44. Compared to other countries this is skewed towards the older population. As in other most other European countries, women employed in the ICT sector are more likely to be in the 25-34 and 35-44 year old age brackets.

Activity rate in % - 1994-2002



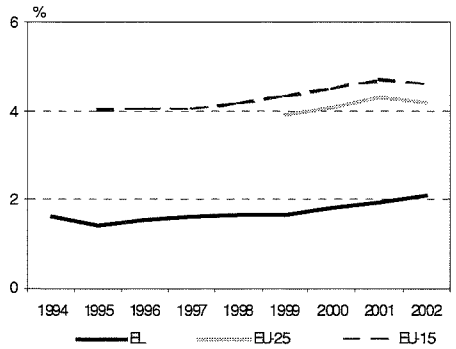
Source: EU LFS

Unemployment rate in % - 1994-2002



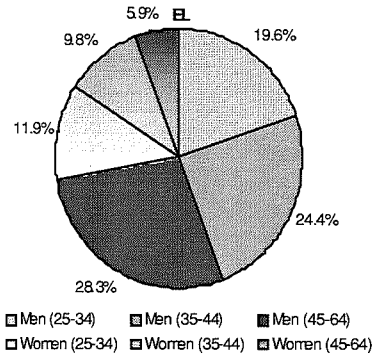
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



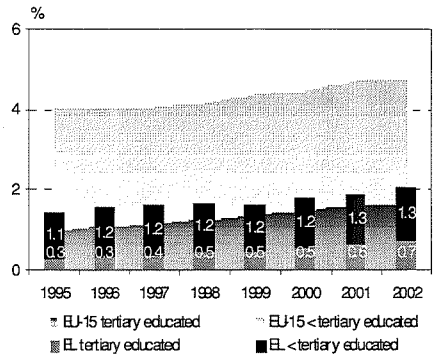
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



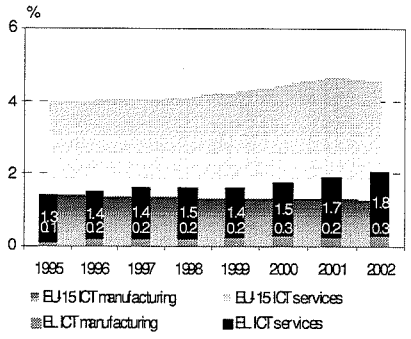
Source: EU LFS

Highly qualified employment in ICT 1995-2002



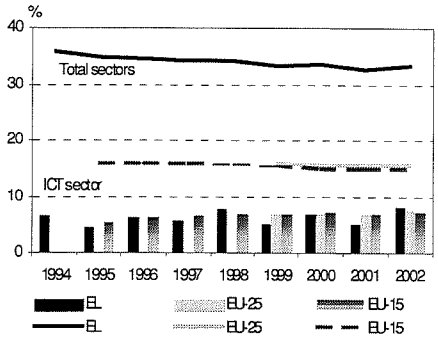
Source: EU LFS

ICT manufacturing and services employment -1995-2002



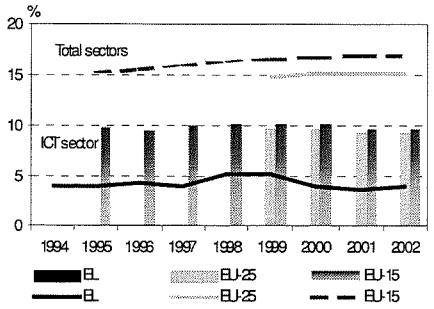
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



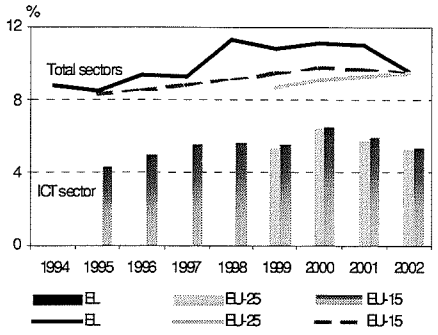
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



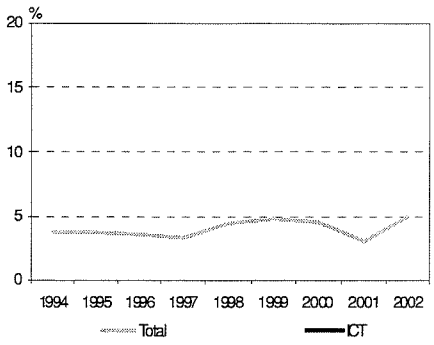
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

The level of overall self-employment in Greece is very high, and though this is principally accounted for by the agricultural sector, the same can be said of other sectors (not in graph). ICT self-employment is not dissimilar to the European average.

Part-time employment, meanwhile, is low compared to the European average, whereas temporary contracts are similar if not slightly higher in Greece compared to the EU.

Reliable reporting of such sub-groups in the ICT sector is not possible in Greece.

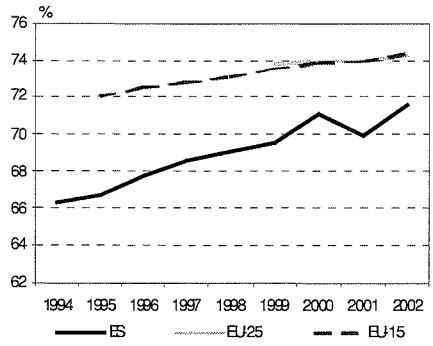
Spain

Underlining the growth in employment experienced in Spain between 1994 and 2002, the activity rate in Spain has increased by close to 6%, despite a strong fall in the unemployment rate. The share of ICT in this total employment has increased slightly over the same period, though still lies somewhat below the European average.

Men account for around two thirds of total ICT employment, though 25-34 year olds account for the lion's share of ICT jobs for both men and women (47% of all male and 56% of all female ICT jobs).

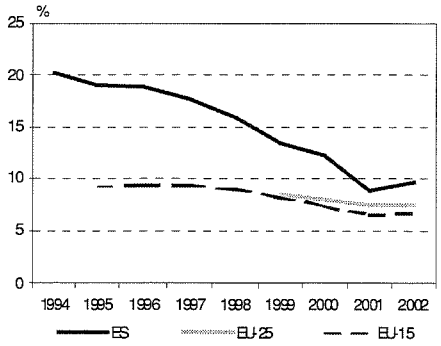
If ICT represents fewer than the European average jobs overall, the propensity to employ the tertiary educated is far higher (56% of all ICT workers are tertiary educated).

Activity rate in % - 1994-2002



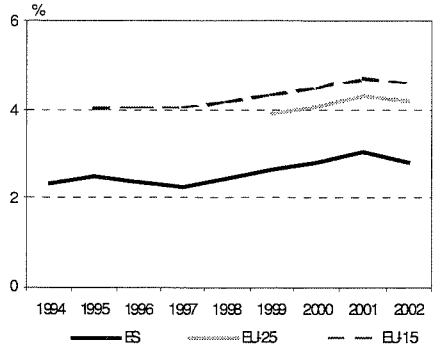
Source: EU LFS

Unemployment rate in % - 1994-2002



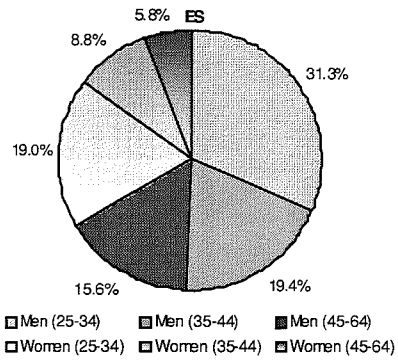
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



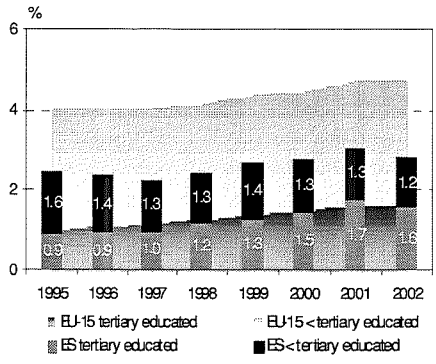
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



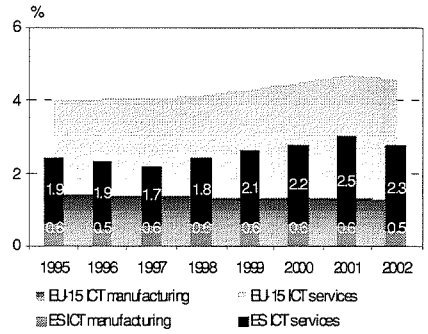
Source: EU LFS

Highly qualified employment in ICT 1995-2002



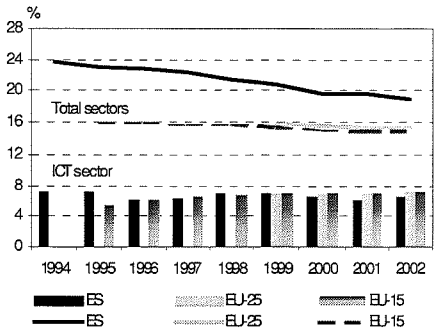
Source: EU LFS

ICT manufacturing and services employment -1995-2002



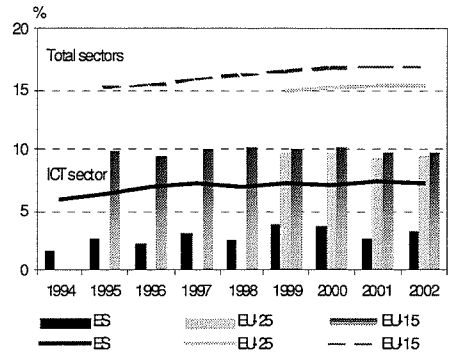
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



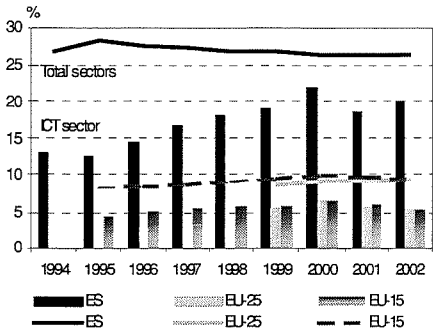
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



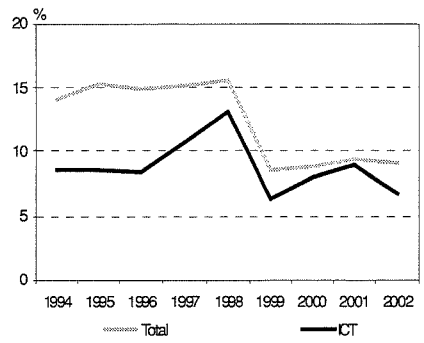
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

ICT is strongly skewed towards the service sector in Spain (83% of all ICT employment is in services).

Although self-employment is more prevalent than is the average in the EU overall, this is not the case when it comes to the ICT sector.

Whereas part-time employment is less widespread in Spain, both in the ICT sector and overall, the proportion of employees with temporary contracts is very high. The disparity between workers on temporary contracts in Spain compared to the EU is greater in ICT than overall.

Job-mobility is slightly lower in the ICT sector than for the overall economy.

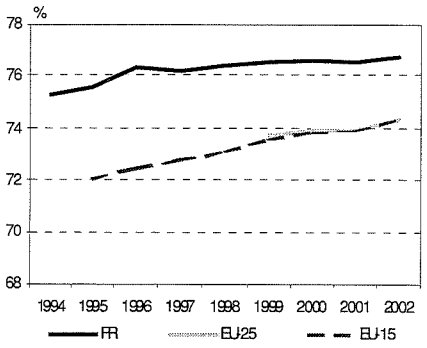
France

The activity rate in France has increased by around 1.5% between 1994 and 2002, though the EU as a whole has been catching up. The unemployment rate has exceeded the EU average for the entire period under consideration.

The share of ICT in total employment has remained relatively stable between 1994 and 2002, with close to 5% of total employment being in ICT in 2002 compared to around 4.5% in the EU.

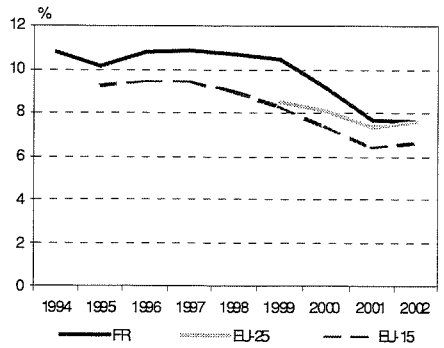
ICT employment in France is predominantly male oriented and more geared towards individuals with a third level education than is the European average (two thirds of all ICT workers are male and 41% have a third level education compared to 34% in the EU in general).

Activity rate in % - 1994-2002



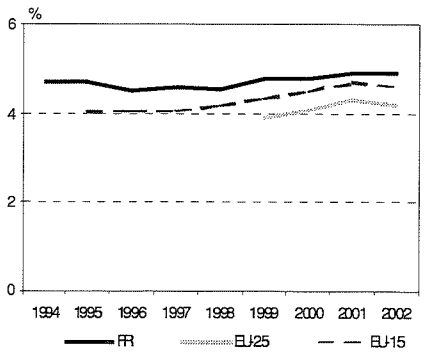
Source: EU LFS

Unemployment rate in % - 1994-2002



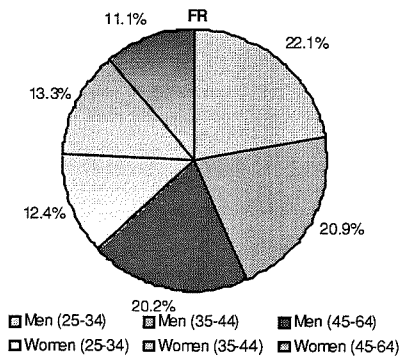
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



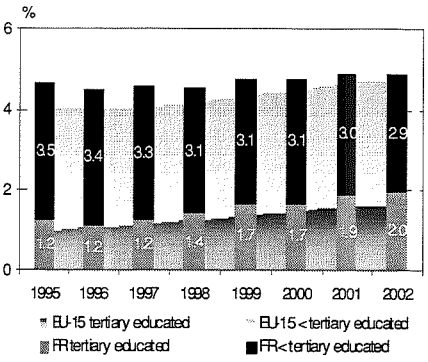
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



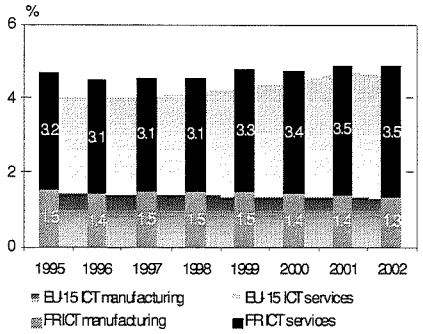
Source: EU LFS

Highly qualified employment in ICT 1995-2002



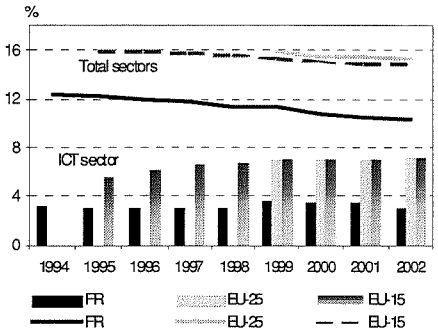
Source: EU LFS

ICT manufacturing and services employment -1995-2002



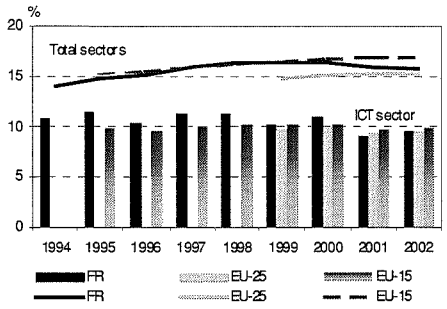
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



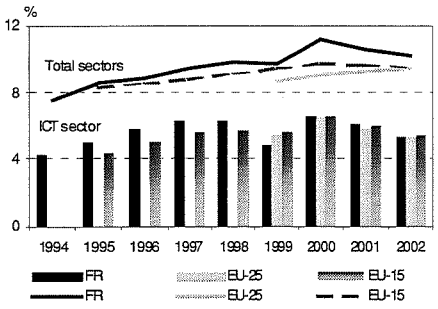
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



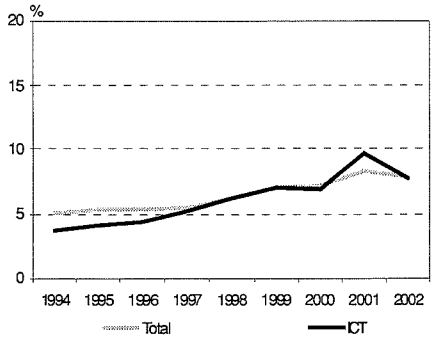
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

ICT employment is marginally more service oriented than the European average.

However, individuals in France are much less likely to be self-employed, whether they are working in the ICT sector or not.

ICT employment in France is characterised by less part-time employment than for the total economy and also greater job-security, with a lower proportion of employees on temporary contracts than overall. Both part-time employment and temporary contracts in France show similar intensities to the European averages.

Job-mobility in ICT is rising, showing a very similar development to that experienced by the economy overall.

Ireland

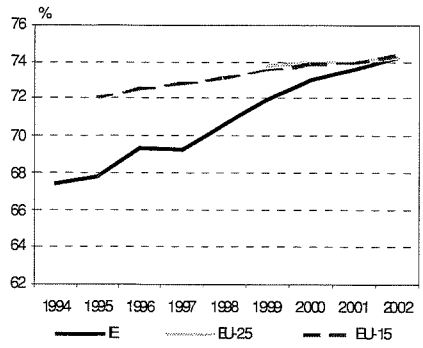
The activity rate in Ireland has risen considerably between 1994 and 2002, when it attained the European average. During this time, the unemployment rate also fell significantly, reaching a near low of 3.5% by 2002.

ICT employment has come to represent an increasingly important share of this employment growth in Ireland — by 2002, 7.5% of all jobs were in the ICT sector.

The majority of these jobs are held by men (65%) and by the young. Men and women aged 25-34 account for over 52% of total ICT employment.

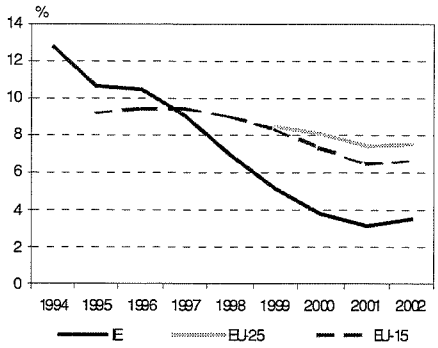
ICT employment is more likely to be highly qualified than in the EU: 44% of ICT workers have a third level education compared to 34% in the EU.

Activity rate in % - 1994-2002



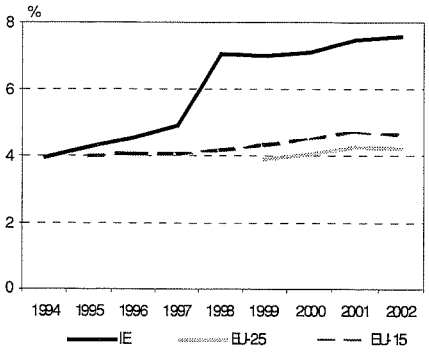
Source: EU LFS

Unemployment rate in % - 1994-2002



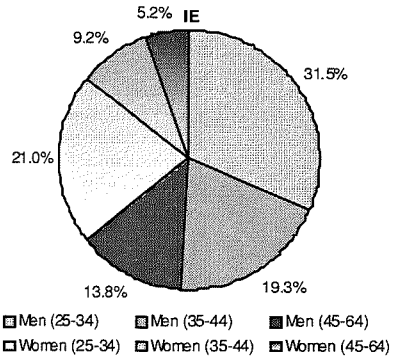
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



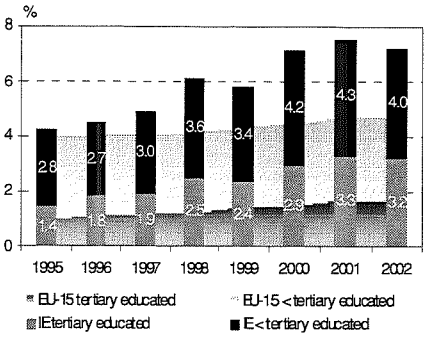
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



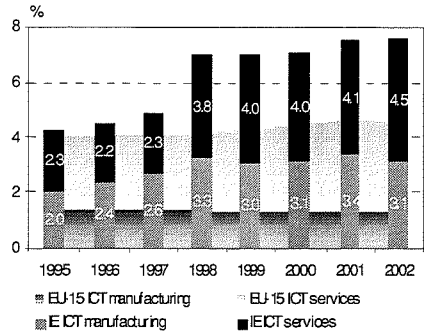
Source: EU LFS

Highly qualified employment in ICT 1995-2002



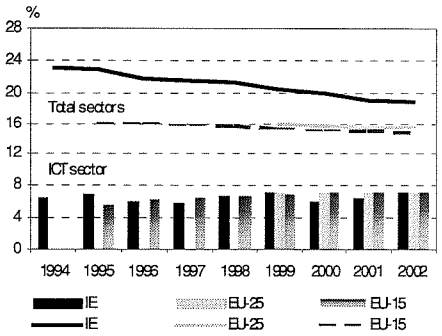
Source: EU LFS

ICT manufacturing and services employment -1995-2002



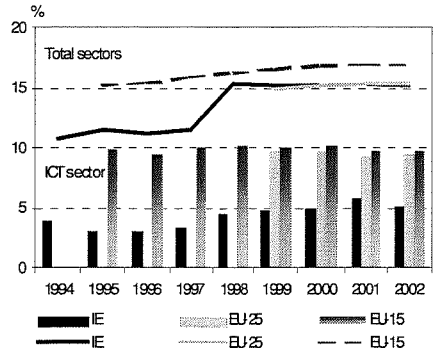
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



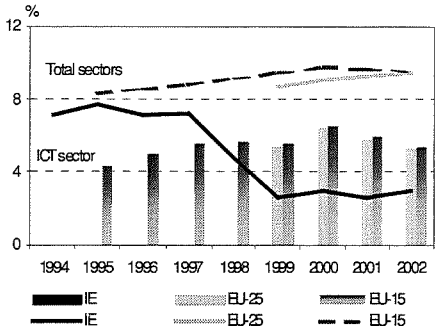
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



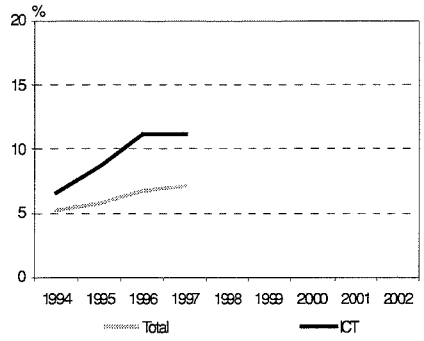
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

Ireland has one of the highest ratios of ICT employment in manufacturing, accounting for 41% of total ICT employment.

Self-employment is again lower in ICT than for the overall economy, as is part-time employment. But whereas part-time employment is on a par with the European average in general, it is far lower when only the ICT sector is taken into account.

Reliable reporting of the incidence of temporary contracts in the ICT sector in Ireland is not possible.

Until reporting ceased in 1997, job mobility in the ICT sector was greater than for the overall economy.

Italy

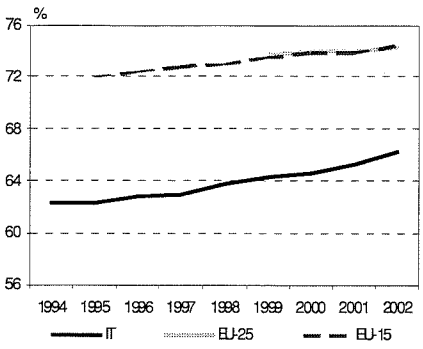
The activity rate in Italy is some distance below the European average, but has been increasing at a faster rate than is the case in the EU. The unemployment rate was below the European average in 1994 but from 1998 onwards has exceeded it.

The share of ICT in total employment has risen marginally in Italy between 1994 and 2002, but remains over 0.5% below the EU-15.

Over two thirds of people employed in the ICT sector are men (68%).

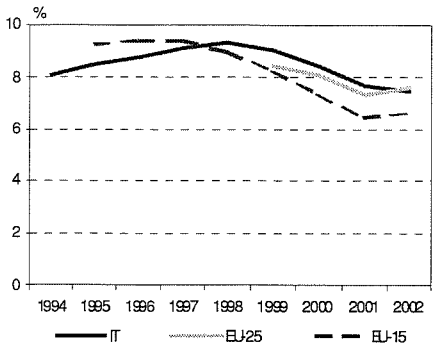
Italy has the lowest proportion of tertiary educated ICT workers (17% of ICT workers have a tertiary education, which is half the EU average).

Activity rate in % - 1994-2002



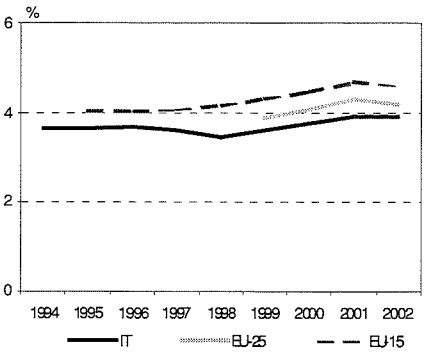
Source: EU LFS

Unemployment rate in % - 1994-2002



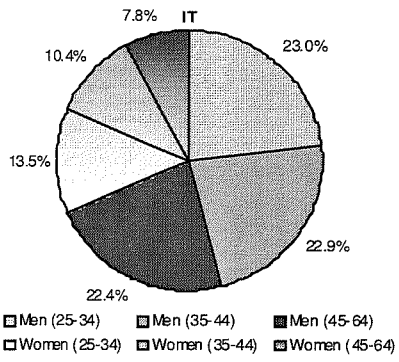
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



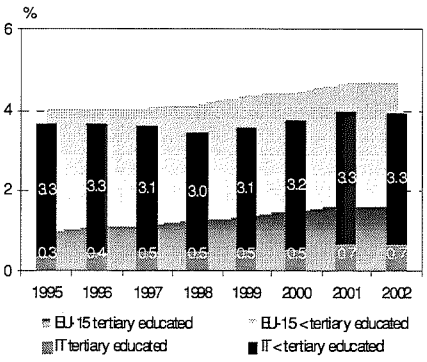
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



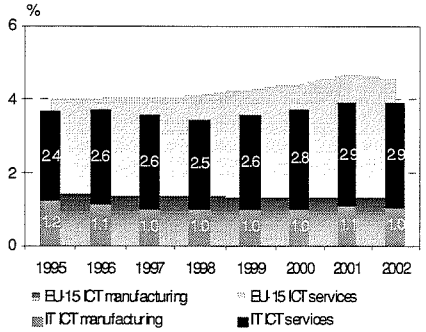
Source: EU LFS

Highly qualified employment in ICT 1995-2002



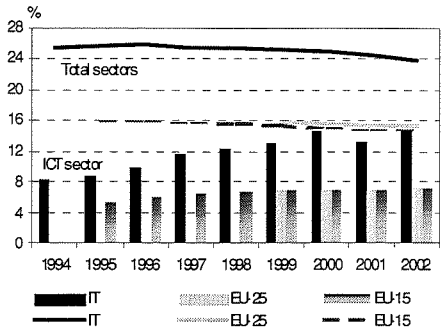
Source: EU LFS

ICT manufacturing and services employment -1995-2002



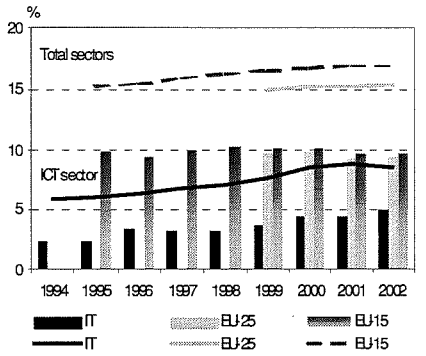
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



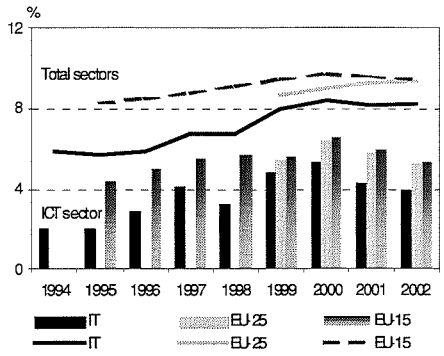
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



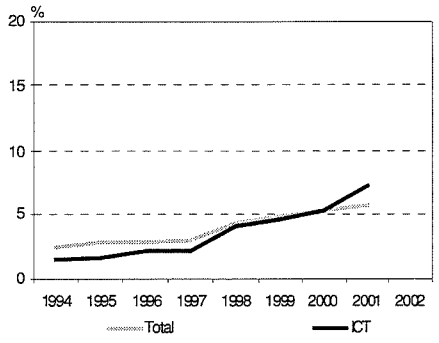
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

The labour market in Italy is characterised by the proportion of people that are self-employed. Both in ICT and overall, the proportion of self-employed is far higher than in the EU in general.

This is combined with an increasing tendency towards part-time employment, but which is still far below the average.

The proportion of people on a temporary contract is lower in the ICT sector than for the overall economy. Both are below their respective EU averages, though are increasing.

Job mobility is generally increasing, but especially in ICT: whereas only around 1.5% of employed ICT workers changed jobs between 1993 and 1994, 7% did so between 2001 and 2002.

Cyprus

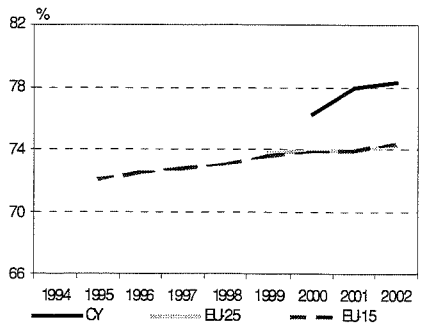
The relatively short time series for Cyprus show an activity rate above that of the EU (around 78% in 2002) and an unemployment rate significantly below (3% in 2002).

The share of ICT in total employment during this time has remained at a stable 1.7%, around 40% of the aggregate level for the EU-25.

Close to three quarters of all people employed in the ICT sector are men, though most are 35-44 years old rather than in the youngest age bracket, as is the case for women and most other countries.

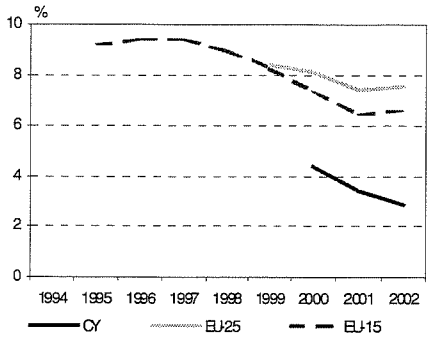
Despite the share of ICT in total employment being relatively low, of those working in ICT, 70% have a tertiary education.

Activity rate in % - 1994-2002



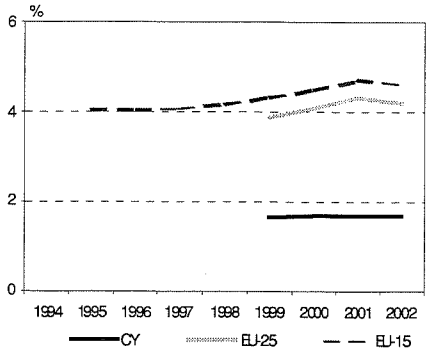
Source: EU LFS

Unemployment rate in % - 1994-2002



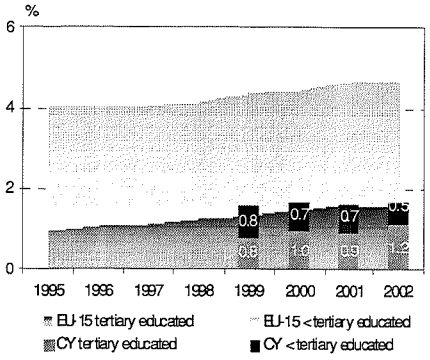
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



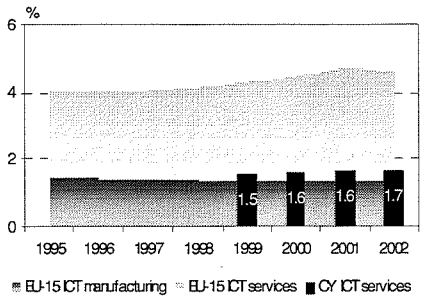
Source: EU LFS

Highly qualified employment in ICT 1995-2002



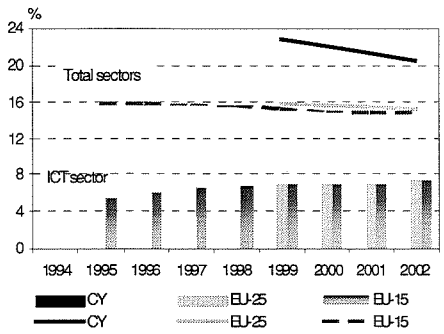
Source: EU LFS

ICT manufacturing and services employment -1995-2002



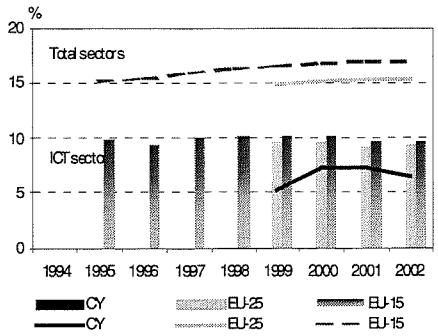
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



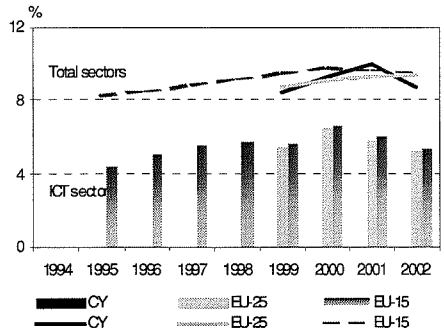
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



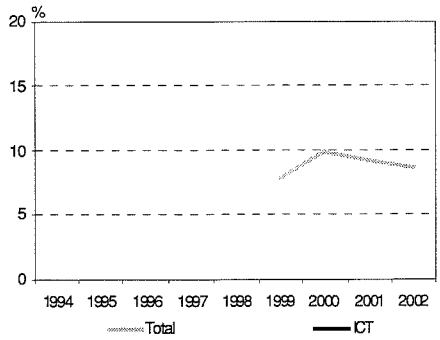
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

Reliable reporting of the above sub-groups in the ICT sector is not possible in Cyprus. In general, however, there is a high degree of self-employment in Cyprus, a low incidence of part-time employment and an average level of employees with temporary contracts.

Overall job-mobility has risen slightly between 1999 and 2002.

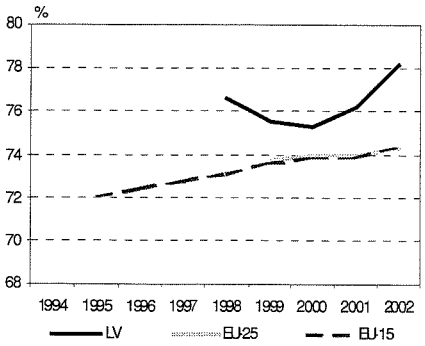
Latvia

The activity rate in Latvia, despite a two year decrease from 1998 to 2000 is up on its 1998 level (78% in 2002). Unemployment has reduced marginally over the same period.

The share of ICT in total employment has increased slightly between 1998 and 2002 (2% compared to 1.6%).

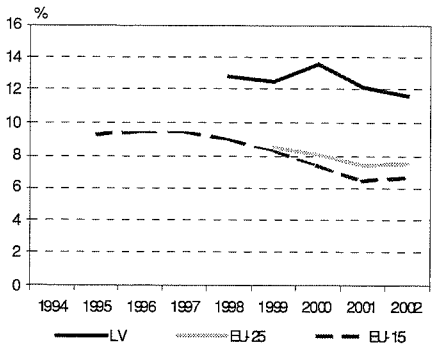
Despite the share of ICT in total employment being relatively low, of those working in ICT, 41% have a tertiary education.

Activity rate in % - 1994-2002



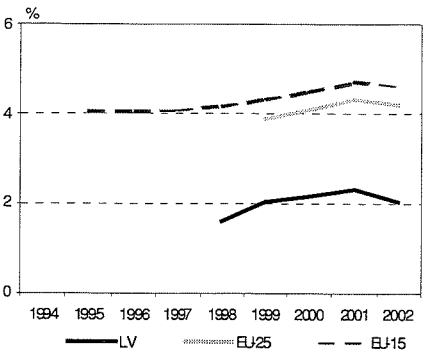
Source: EU LFS

Unemployment rate in % - 1994-2002



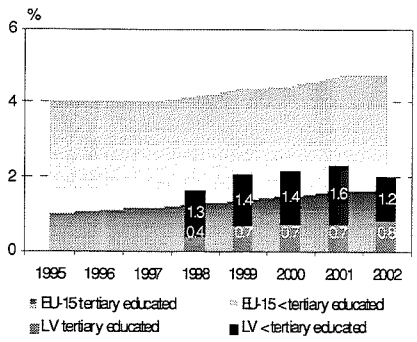
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



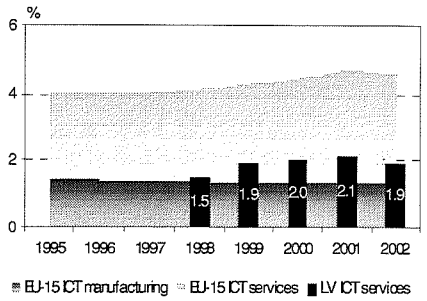
Source: EU LFS

Highly qualified employment in ICT 1995-2002



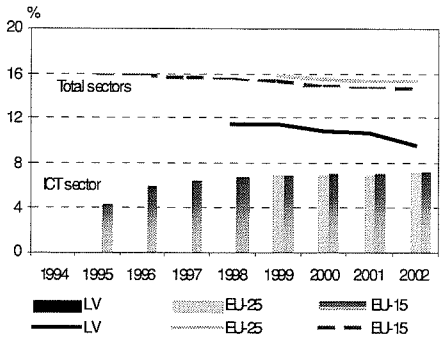
Source: EU LFS

ICT manufacturing and services employment -1995-2002



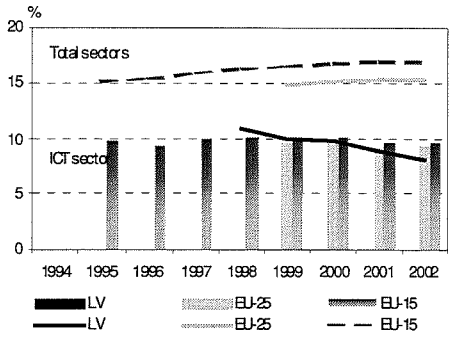
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



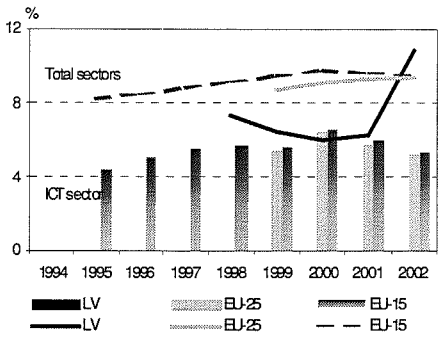
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



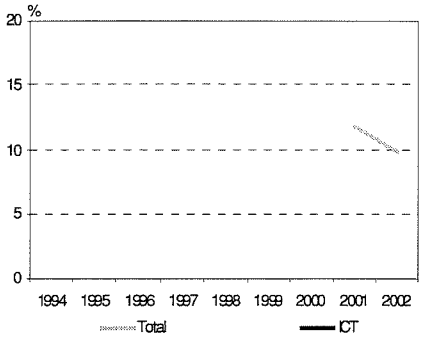
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

Reliable reporting of the most sub-groups in the ICT sector is not possible in Latvia. In general, however, there is a lower degree of self-employment in Latvia than in the EU as well as a relatively low level of part-time employment.

Job-security in Latvia has fallen, as shown by the rising to above average level of employees with temporary contracts.

Total job-mobility, which is only reported for two years, has fallen between 2001 and 2002 to around 10%.

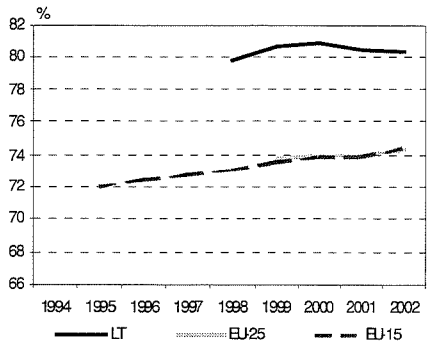
Lithuania

Between 1998 and 2002 the activity rate in Lithuania has remained relatively stable. In 2002, it stood at 82%, 8% above the European average. The unemployment rate, however, has fluctuated significantly over time but has continued to exceed the EU level.

During this time, the share of ICT in total employment has fallen from 2.7% to around 2%, with the ICT sector contracting in volume terms.

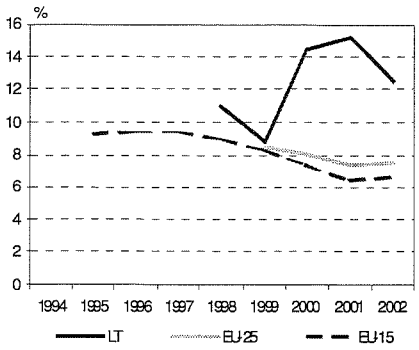
In 2002, the tertiary educated accounted for 56% of all ICT workers.

Activity rate in % - 1994-2002



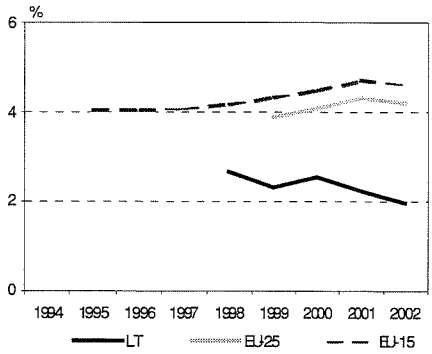
Source: EU LFS

Unemployment rate in % - 1994-2002



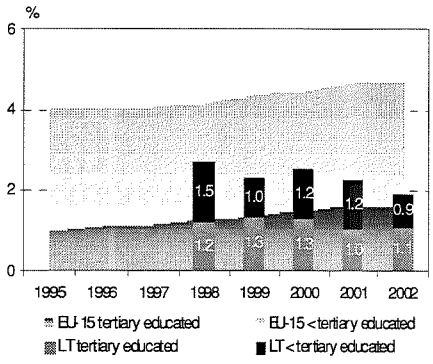
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



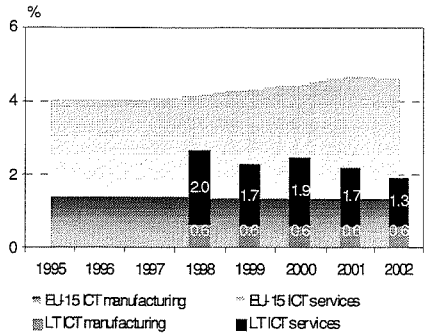
Source: EU LFS

Highly qualified employment in ICT 1995-2002



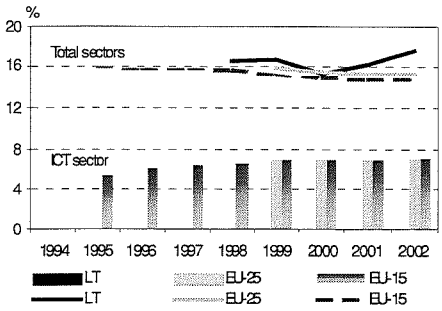
Source: EU LFS

ICT manufacturing and services employment -1995-2002



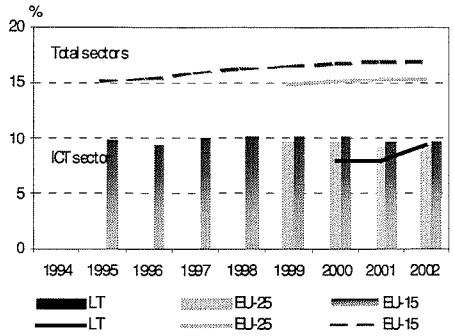
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



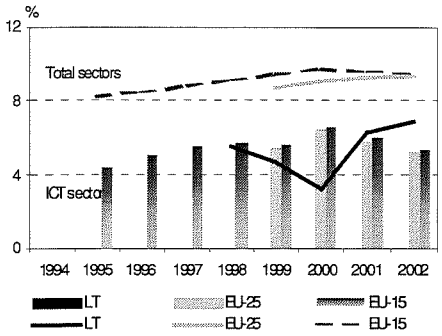
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



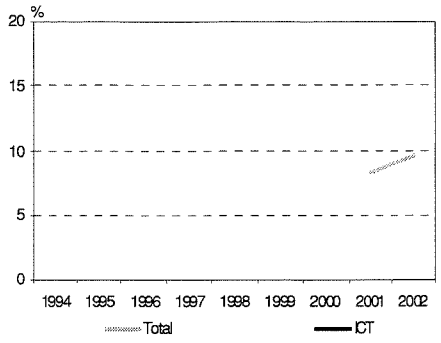
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

In terms of the proportion of ICT employment, Lithuania has a slightly below average level of ICT employment in services in 2002, down on its previous levels.

Reliable reporting of the most sub-groups in the ICT sector is not possible in Lithuania. In general, however, there is a similar level of self-employment in Lithuania than in the EU as well as a relatively low level of part-time employment. The proportion of employees on a temporary contract is also lower in Latvia than in the EU in general.

Total job-mobility, which is only reported for two years, has risen between 2001 and 2002 to around 10%.

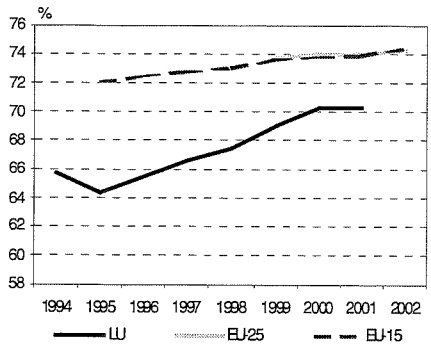
Luxembourg

In Luxembourg, the activity rate has risen almost steadily between 1994 and 2001. At 70% it stood at 4% below the European average, due in part to the low level of unemployment evident (1.4% in 2001).

The proportion of jobs that are in the ICT sector has grown over time, peaking in 1999 and representing 3% in 2001, which is still some distance behind the European average.

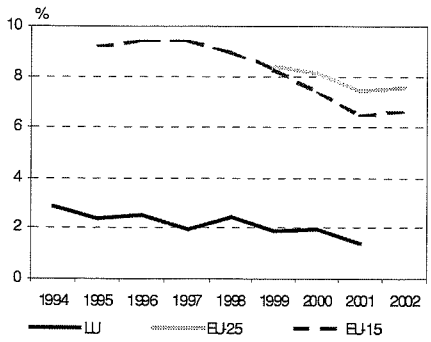
Despite the share of ICT in total employment being relatively low, of those working in ICT, 32% have a tertiary education, just beneath the EU average of 34%.

Activity rate in % - 1994-2002



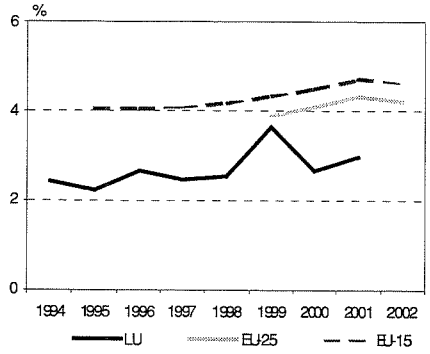
Source: EU LFS

Unemployment rate in % - 1994-2002



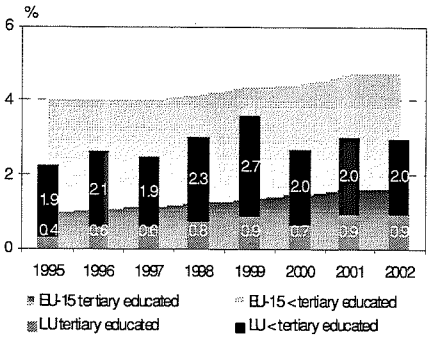
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



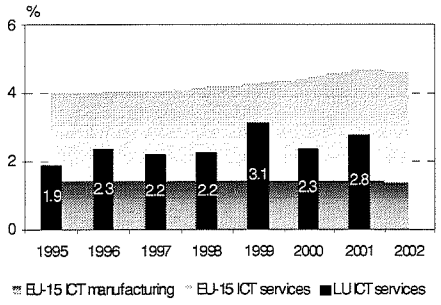
Source: EU LFS

Highly qualified employment in ICT 1995-2002



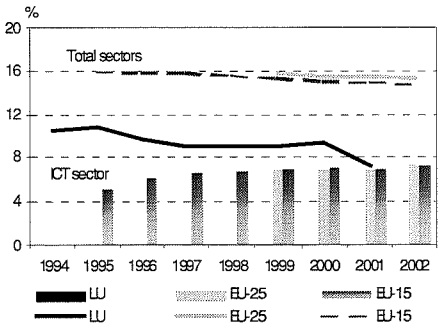
Source: EU LFS

ICT manufacturing and services employment -1995-2002



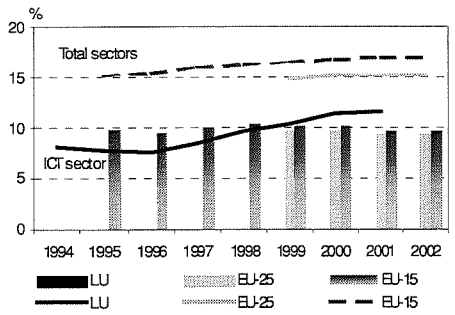
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



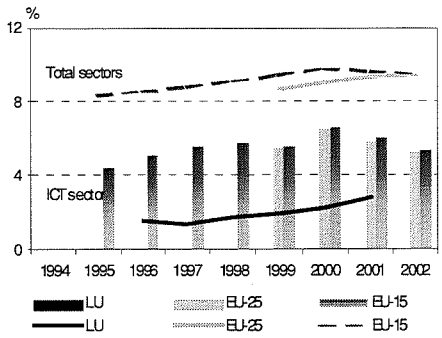
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



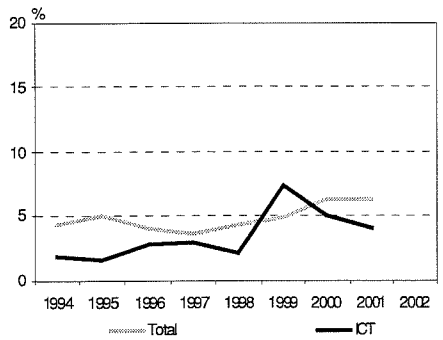
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

Reliable reporting of the most sub-groups in the ICT sector is not possible in Luxembourg.

Taking the economy overall, however, the frequency of self-employment in Luxembourg is lower than in the EU in general, and is falling. On the other hand, part-time employment is increasing, even if in 2001 it represented 11.4% of total employment, compared to the EU-15 average of 16.9%. Temporary contracts are few and far between in Luxembourg (2.8% of all employees in 2001).

Other than its peak in 1999, job mobility in the ICT has been a few percentage points lower than for the economy as a whole.

Hungary

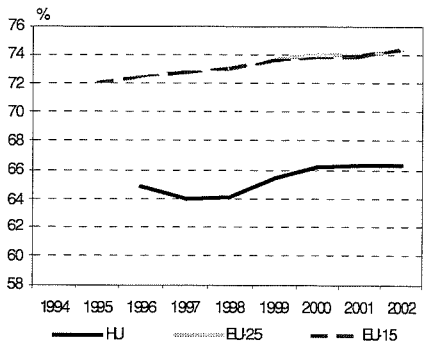
Between 1996 and 2002, the activity rate in Hungary increased slightly. By 2002, it stood at 66.4% compared to the EU-25 average of 74.3%. During the same time, the unemployment rate fell from a high of 8.6% in 1996 to a low of 5% in 2002.

The share of ICT in total employment has continued to rise. In 2002, ICT sector employment represented 5.1% of total employment, marginally down on its 2001 high of 5.3%.

Men aged 25-34 account for the largest proportion of ICT workers at 24% compared to 16.4% for their female counterparts.

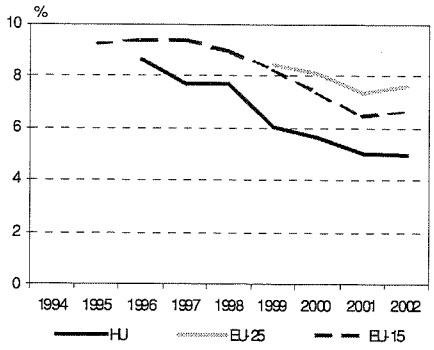
ICT jobs are predominantly carried out by people without a tertiary level education.

Activity rate in % - 1994-2002



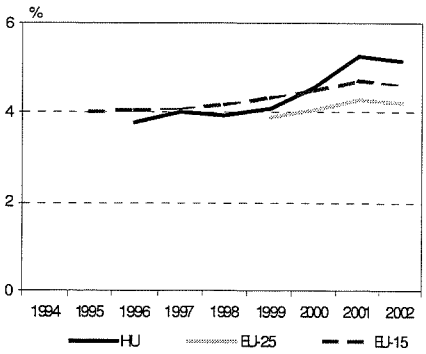
Source: EU LFS

Unemployment rate in % - 1994-2002



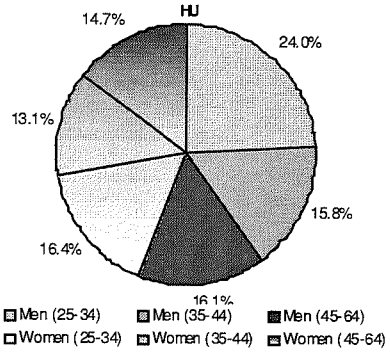
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



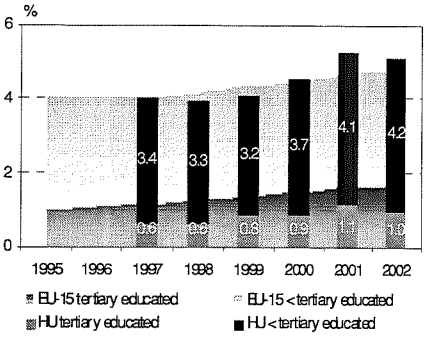
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



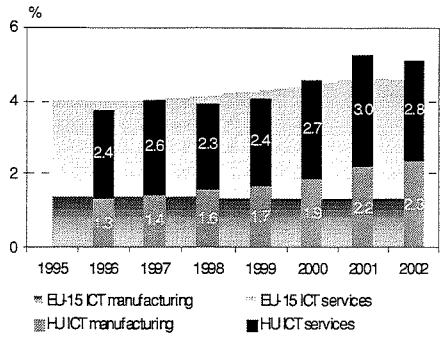
Source: EU LFS

Highly qualified employment in ICT 1995-2002



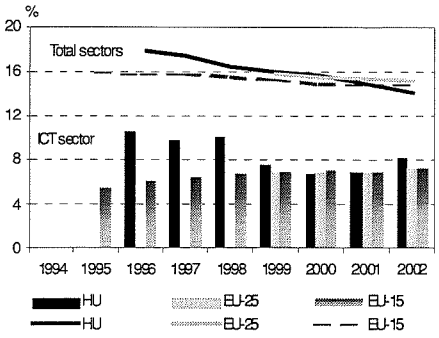
Source: EU LFS

ICT manufacturing and services employment -1995-2002



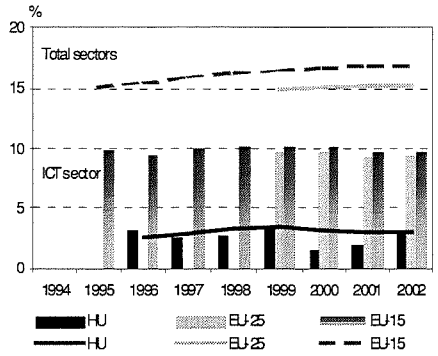
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



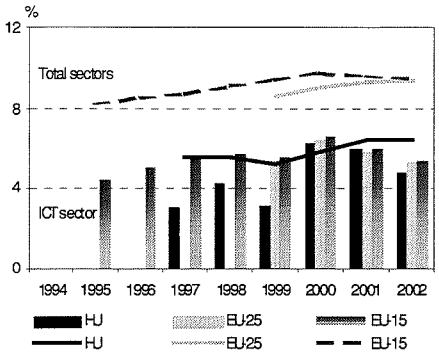
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



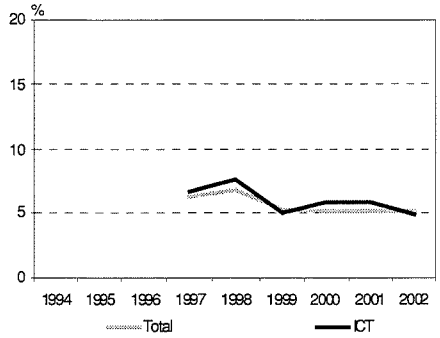
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

Hungary has the highest proportion of its ICT workers in manufacturing: 45% of ICT employment.

Self-employment has reduced for both the ICT sector and overall, though in contrast to the total economy, self-employment in ICT is above the European average in 2002.

Part-time employment is rare in Hungary, whether you work in ICT or not. By 2002, meanwhile, you were almost as likely to be on a temporary contract if you worked in the ICT sector as in the EU generally. Not so for the economy overall.

Trends in job mobility in ICT follow a similar pattern to the overall economy.

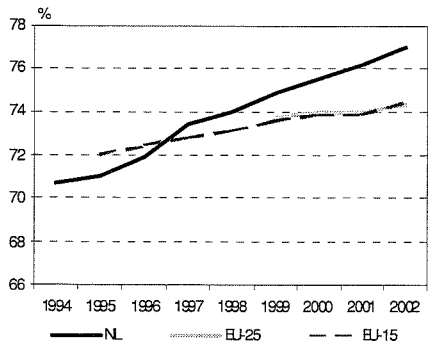
Netherlands

The activity rate in the Netherlands has increased by over 1% a year so that by 2002 it stood at 77%, close to 4% above the European average. In parallel, the unemployment rate fell rapidly from over 6% in 1994 to 2.2% in 2002.

ICT has grown slightly, though the trend is comparable to that seen in Europe generally.

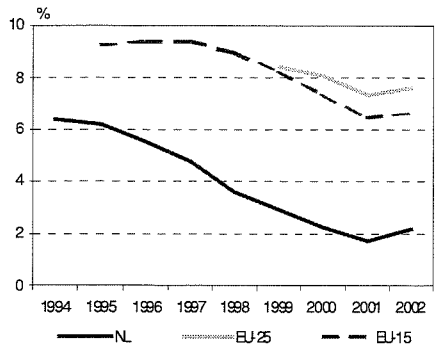
The Netherlands has the most male dominated ICT sector, where over 75% of all ICT workers are men. There are more men aged 25-34 in ICT (or even aged 35-44) than there are total women.

Activity rate in % - 1994-2002



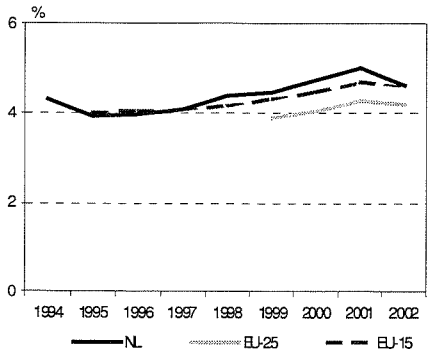
Source: EU LFS

Unemployment rate in % - 1994-2002



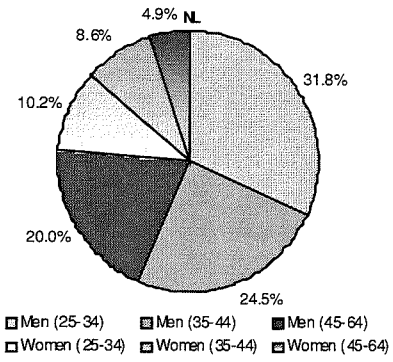
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



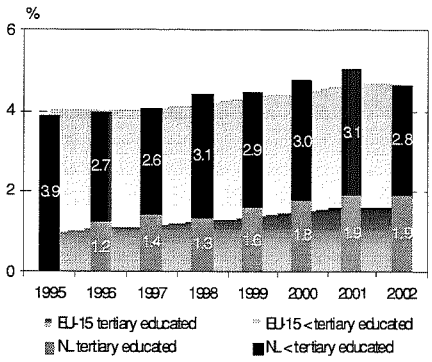
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



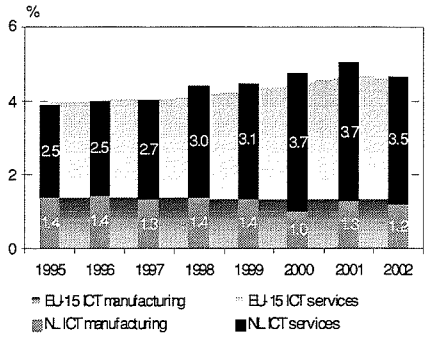
Source: EU LFS

Highly qualified employment in ICT 1995-2002



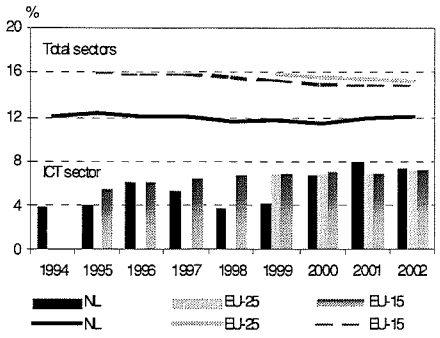
Source: EU LFS

ICT manufacturing and services employment -1995-2002



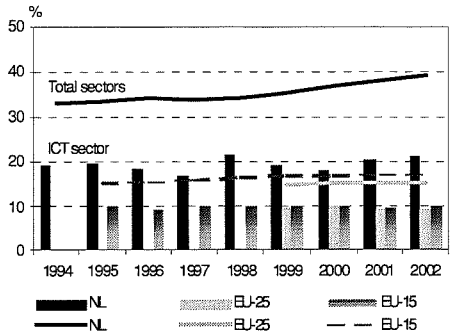
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



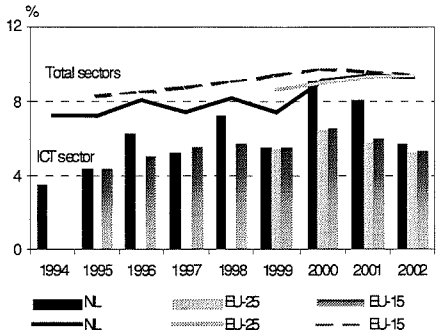
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



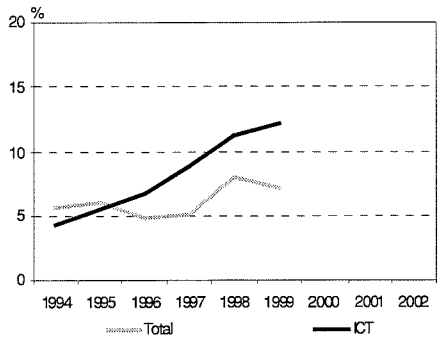
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

The ICT sector in the Netherlands is marginally more service oriented than the EU.

The Netherlands has an extremely high rate of part-time employment, both in the ICT sector and overall, with the vast majority of these jobs held by women.

Temporary contracts, at or slightly below the European average between 1994 and 2002 for the overall economy, have fluctuated significantly in the ICT sector, though have tended to exceed European averages.

Job mobility in the ICT sector saw a steady increase until 1999 when reporting ceased, at which point 12.2% of all ICT workers had changed jobs between 1998 and 1999.

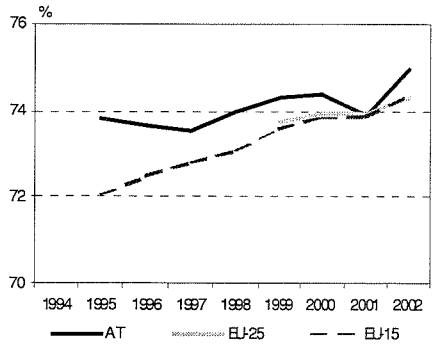
Austria

The activity rate in Austria increased by just over 1% between 1995 and 2002. The unemployment rate, meanwhile, was also up slightly on its 1995 level at 4.6%.

The share of ICT in total employment has continued to grow, albeit at a relatively low rate. In 2002, ICT accounted for 5.1% of all jobs in Austria.

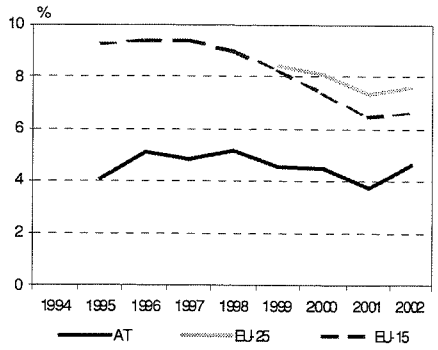
Men account for 71% of all ICT jobs in Austria, with 25-34 year olds accounting for a slightly larger proportion of total ICT employment for men and 35-44 year olds for women.

Activity rate in % - 1994-2002



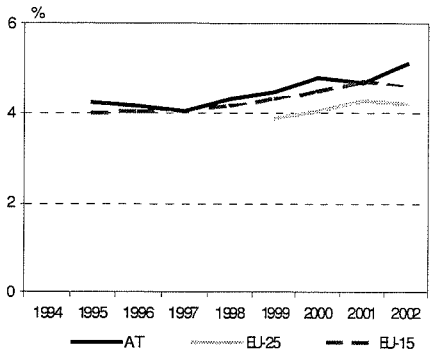
Source: EU LFS

Unemployment rate in % - 1994-2002



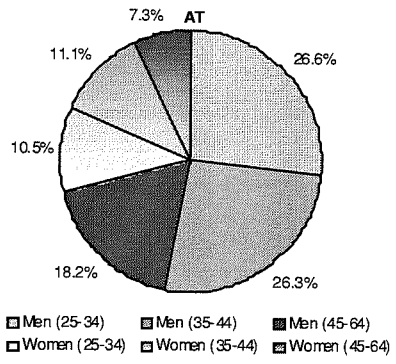
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



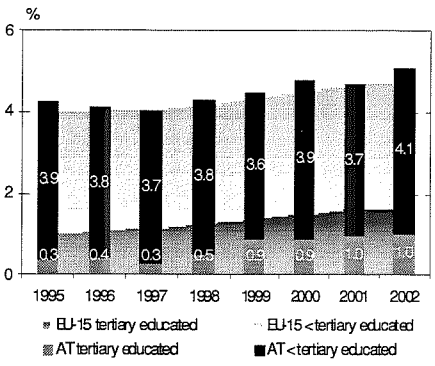
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



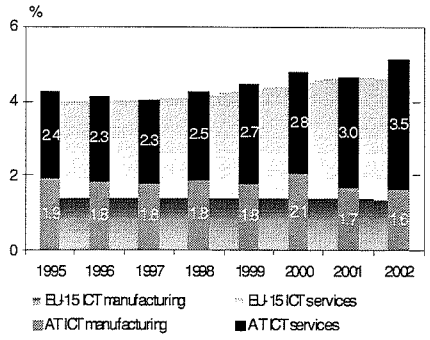
Source: EU LFS

Highly qualified employment in ICT 1995-2002



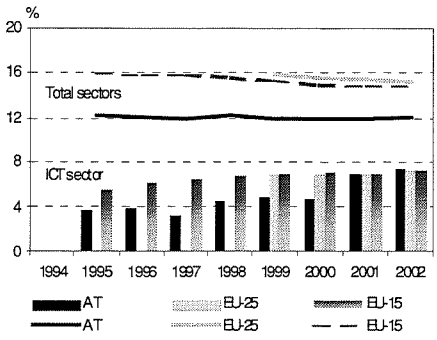
Source: EU LFS

ICT manufacturing and services employment -1995-2002



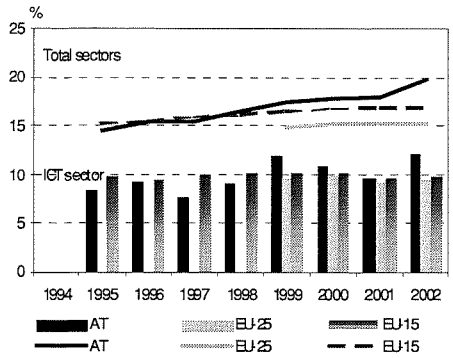
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



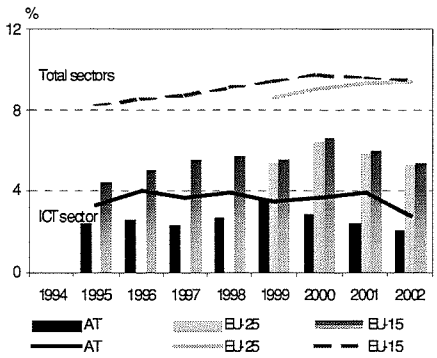
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



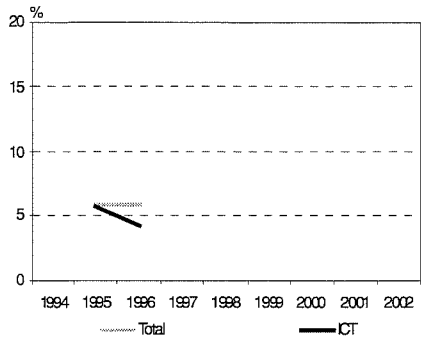
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

Austria has an above average proportion of its ICT jobs in manufacturing.

In 2002, just over 7% of all ICT workers were self-employed, around the same as the European average. This compares with 12% for the total economy in Austria.

Part-time employment has been increasing, for the ICT sector and overall. Both outweigh the respective EU averages.

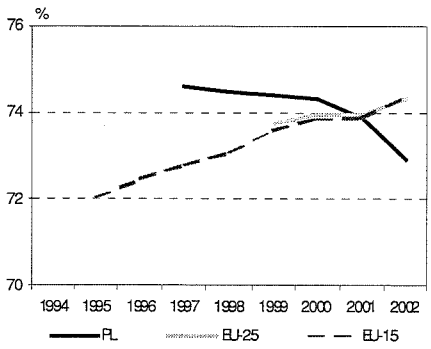
Temporary contracts are less prevalent in Austria, the ICT sector providing slightly more job-security than the economy overall.

Poland

The activity rate in Poland has fallen by 1.7% between 1997 and 2002. Meantime, the unemployment rate has risen dramatically from around 10% in 1997 to 17% in 2002.

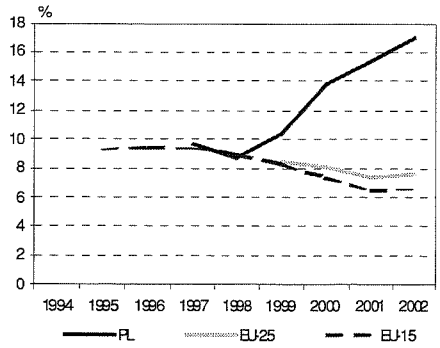
It is not possible to measure ICT in Poland since the breakdowns provided for the NACE sector are not detailed enough to calculate ICT.

Activity rate in % - 1994-2002



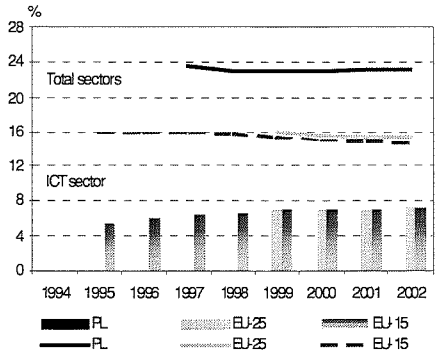
Source: EU LFS

Unemployment rate in % - 1994-2002



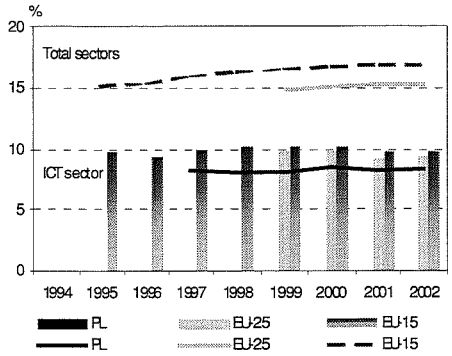
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



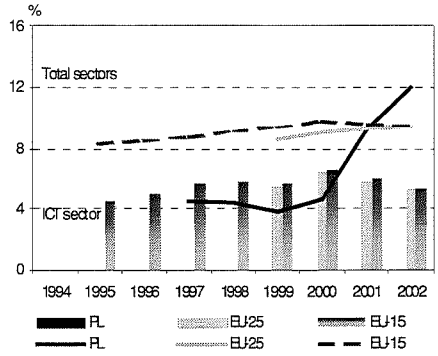
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



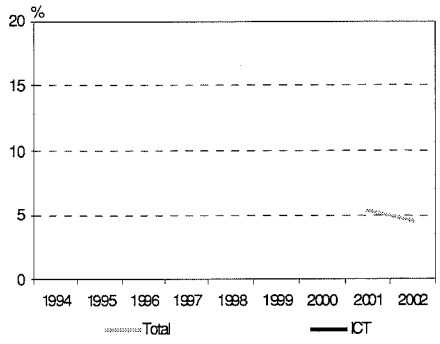
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

Overall, individuals have a much higher than average propensity to be self-employed in Poland.

On the other hand, the existence of part-time employment is less prevalent.

Job security has fallen over the years since the proportion of people on temporary contracts has risen considerably (in parallel with rising unemployment).

Total job-mobility, which is only reported for two years, has fallen between 2001 and 2002 to just below 5%.

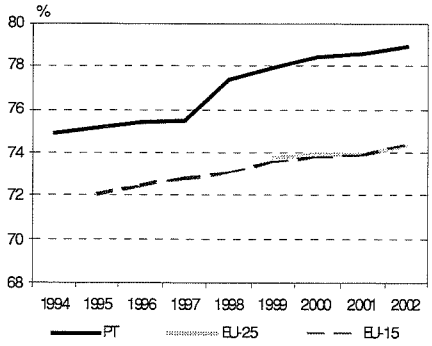
Portugal

The activity rate in Portugal has risen steadily in the surveyed period. Throughout, it has remained above the European average. The unemployment rate, meanwhile, though up on its 2001 low of 3.3%, still fell between 1994 and 2002 from 5.5% to 3.9%.

The share of ICT in total employment has, however, fallen. Whereas in 1994, 2.3% of all jobs were in ICT, by 2002, it was only 1.7%.

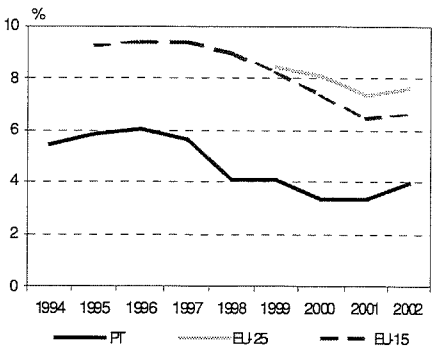
Furthermore, the ICT sector in Portugal is less likely to employ highly qualified individuals than the average: 22% of ICT workers have a tertiary education.

Activity rate in % - 1994-2002



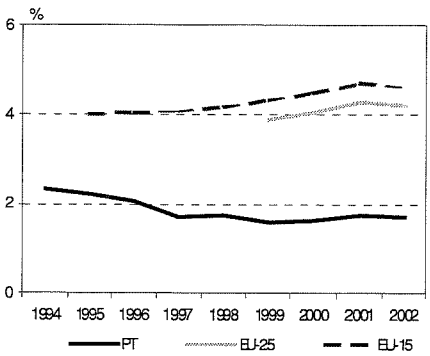
Source: EU LFS

Unemployment rate in % - 1994-2002



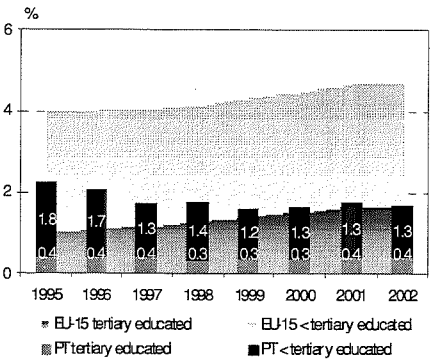
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



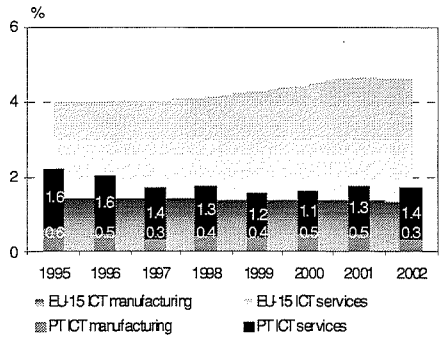
Source: EU LFS

Highly qualified employment in ICT 1995-2002



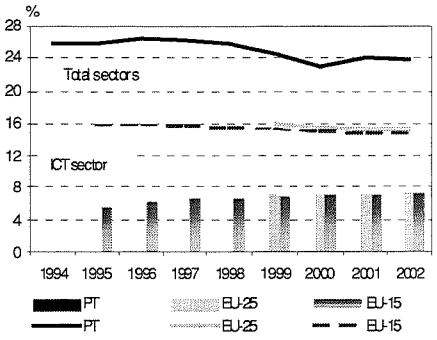
Source: EU LFS

ICT manufacturing and services employment -1995-2002



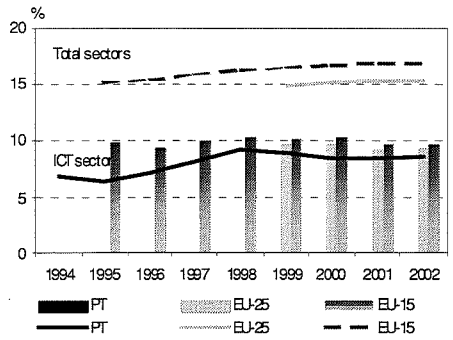
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



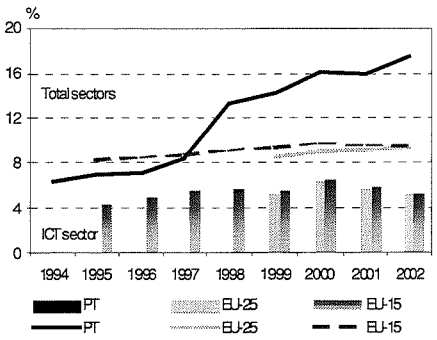
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



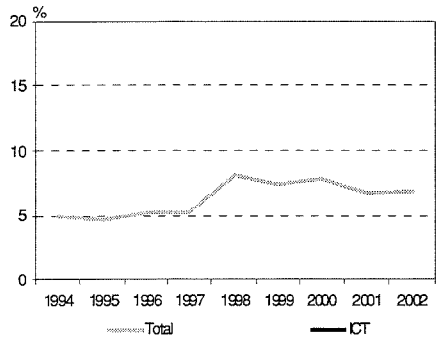
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

In Portugal, there is an above average proportion of ICT employment in services: 80% of ICT workers are in services rather than manufacturing compared to 71% at the European level.

Reliable reporting of the remaining sub-groups in the ICT sector is not possible in Portugal. Taking the economy overall, however, the frequency of self-employment in Portugal is higher than in the EU in general, though is falling. On the other hand, part-time employment is increasing, even if not at the rate seen by the prevalence of temporary contracts.

Total job mobility has increased between 1994 and 2002.

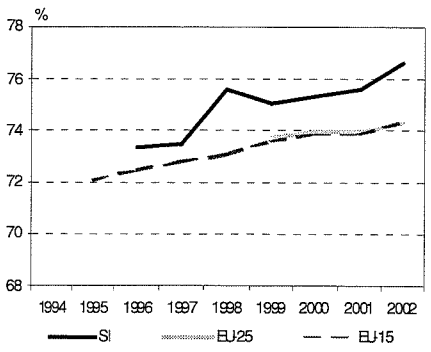
Slovenia

In Slovenia, the activity rate has increased by close to 3.5% and has remained above the Euro-pean average over the entire time period. At the same time, the unemployment rate in Slovenia has been relatively stable, representing 5% of the labour force in 2002.

The share of ICT employment, however, has remained stable. In 2002, just as in 1996, ICT jobs accounted for 3% of all jobs in Slovenia.

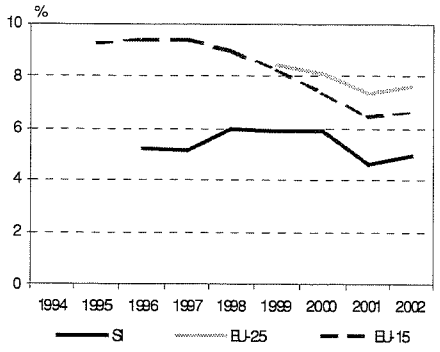
Men hold 60% of all ICT jobs in Slovenia and a quarter of all these jobs are held by 25-34 year old men. Women aged 25-34 are just as likely to work in ICT as those aged 35-44 (16.4%).

Activity rate in % - 1994-2002



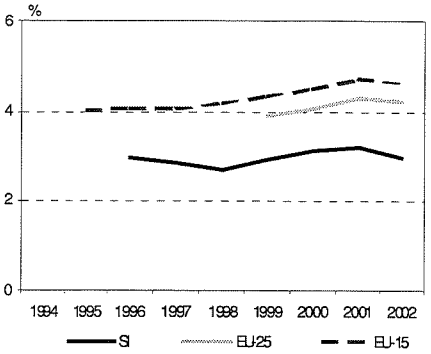
Source: EU LFS

Unemployment rate in % - 1994-2002



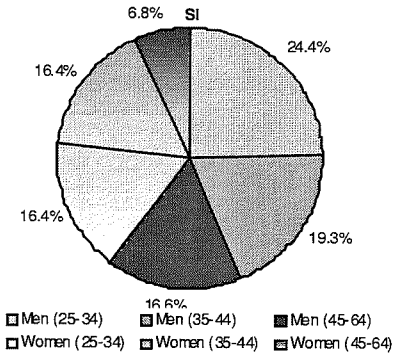
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



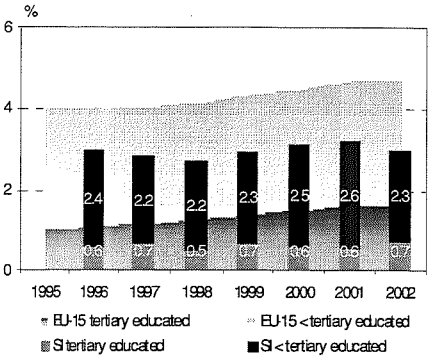
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



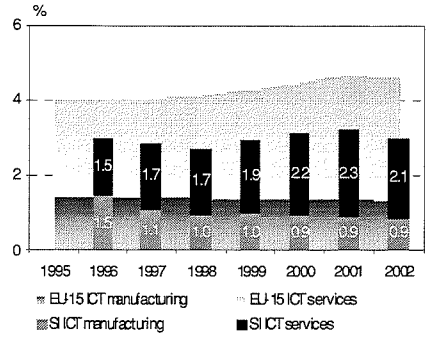
Source: EU LFS

Highly qualified employment in ICT 1995-2002



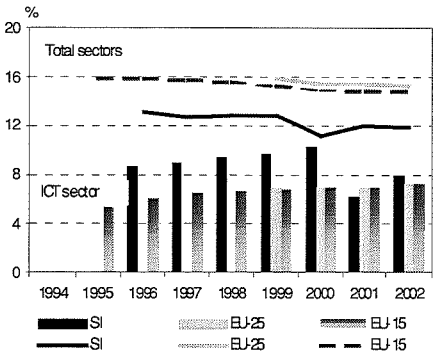
Source: EU LFS

ICT manufacturing and services employment -1995-2002



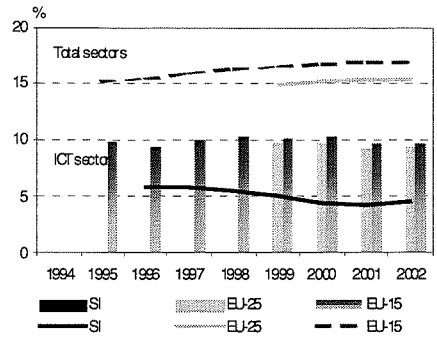
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



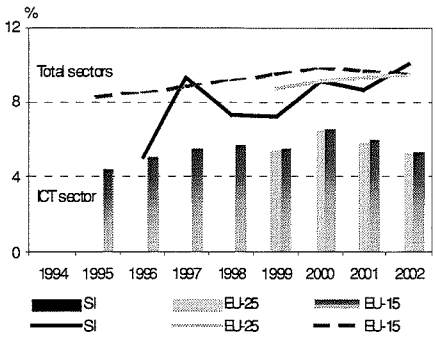
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



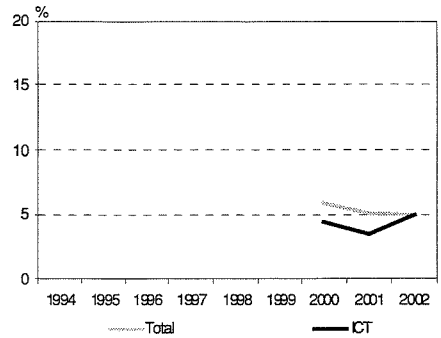
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

Despite having a below average share of ICT employment in total employment, of those people working in ICT, it is as likely as the European average that they are working in ICT services (71% of all ICT jobs).

Self-employment, though lower than in Europe for the overall economy, is nevertheless higher when it comes to ICT. Less so in recent years.

Part-time employment is far less prevalent in Slovenia, while temporary contracts have become increasingly so.

Job-mobility, which is only reported for three years, is equal in 2002 for ICT and the overall economy.

Slovakia

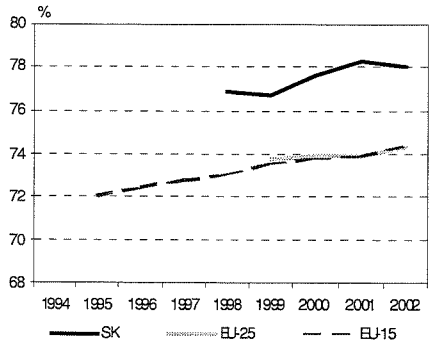
In Slovakia, the activity rate in 2002 was around 4% higher than in the EU-25, at 78%. This is partly due to the high unemployment rate that is evident, especially from 2000 onwards.

ICT employment is a little behind the European average, at 3.8%, rising from 3.3% in 1998.

Slovakia has the highest proportion of women in ICT jobs, with just under 56%. Of these, most are in the 35-44 year old age bracket.

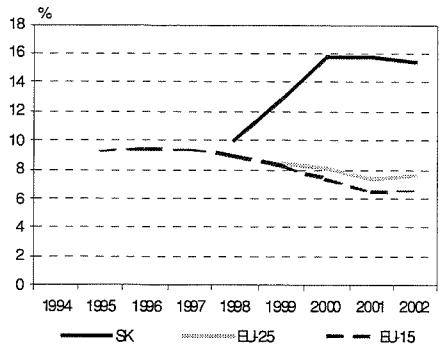
A lower than average proportion of ICT jobs are carried out by the tertiary educated in 2002 (26% compared to 34%).

Activity rate in % - 1994-2002



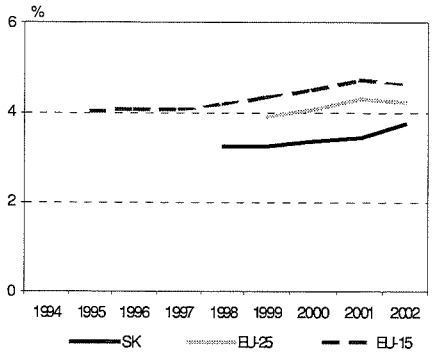
Source: EU LFS

Unemployment rate in % - 1994-2002



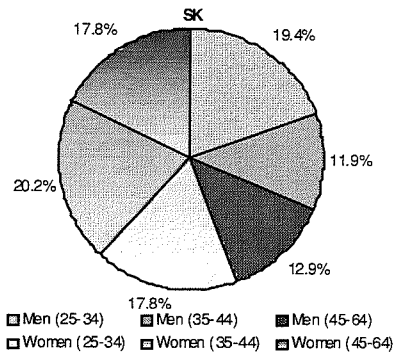
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



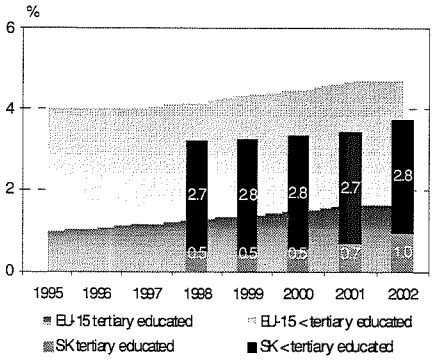
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



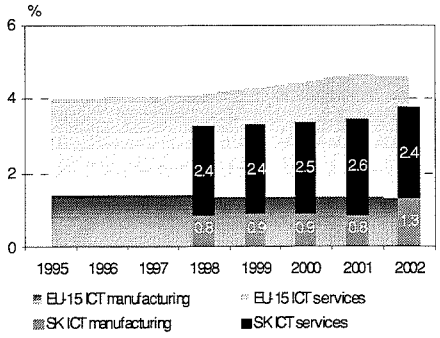
Source: EU LFS

Highly qualified employment in ICT 1995-2002



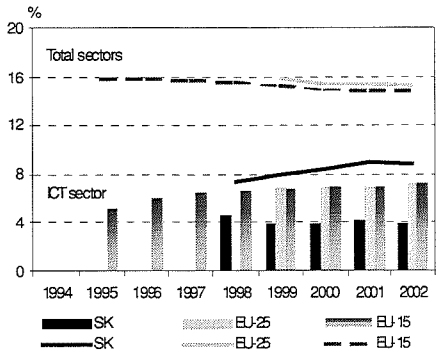
Source: EU LFS

ICT manufacturing and services employment -1995-2002



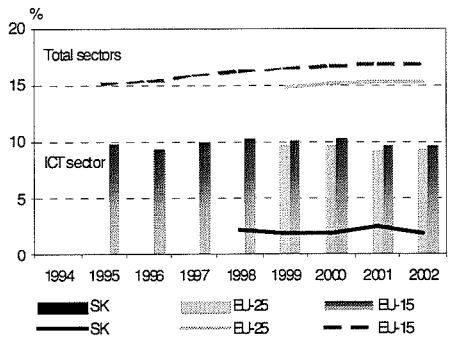
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



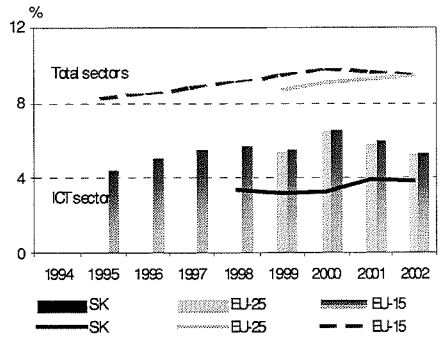
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



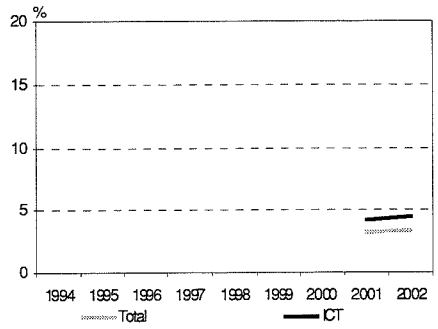
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

Other than in 2002, ICT jobs are geared more than average towards services than manufacturing.

Self-employment, both in ICT and overall, is low than average in Slovakia.

Reliable reporting of the remaining sub-groups in the ICT sector is not possible. Taking the economy overall, however, part-time employment is extremely low in Slovakia. The existence of temporary contracts is also some distance lower than the European average.

Job-mobility, which is only reported for two years, is marginally higher in 2002 for the ICT sector, though is still lower than 5%.

Finland

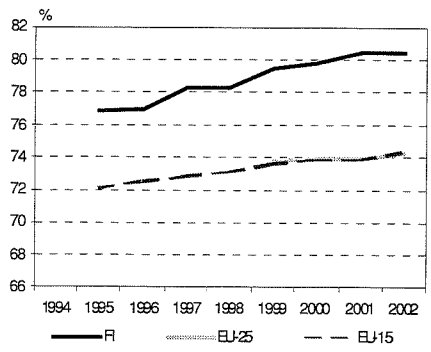
In Finland, the activity rate has increased steadily between 1995 and 2002, by which time over 80% of 25-64 year olds were either employed or unemployed. The unemployment rate, meanwhile, has fallen from its 1995 high of around 14% to 7.4% in 2002, a little above the average for the EU-15.

The importance of the ICT sector has continued to grow in Finland, representing almost 6% of all jobs in 2002.

The ICT sector, however, is dominated by men, and principally by those aged 25-34: 64% of all ICT jobs are held by men and around 29% by those aged 25-34.

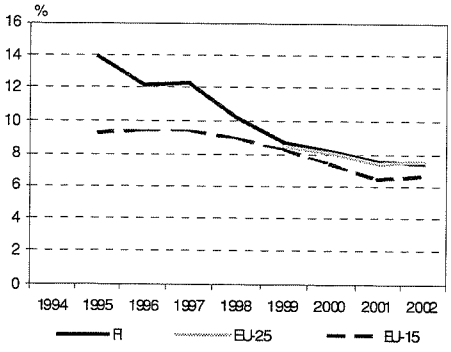
More than half of all ICT jobs in 2002 were carried out by people with a third level education.

Activity rate in % - 1994-2002



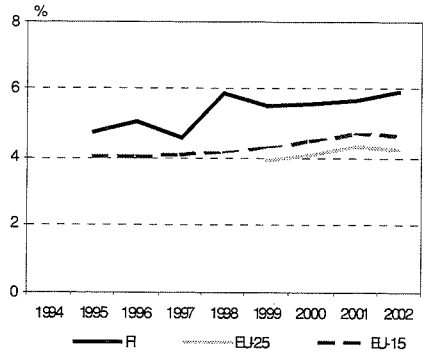
Source: EU LFS

Unemployment rate in % - 1994-2002



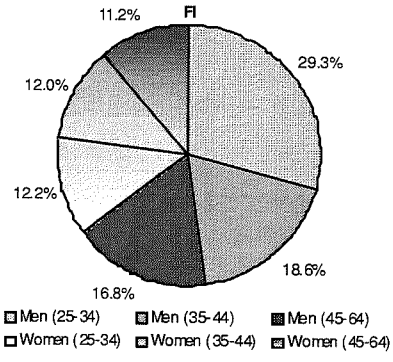
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



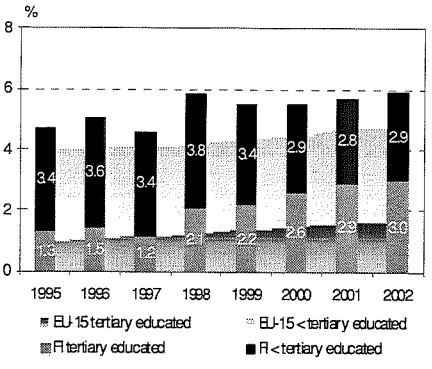
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



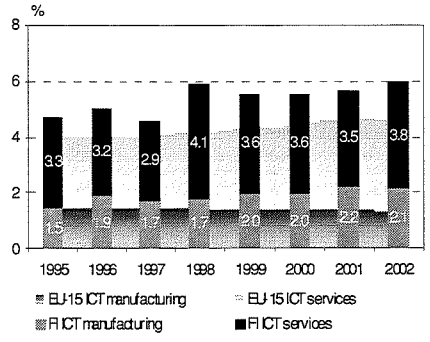
Source: EU LFS

Highly qualified employment in ICT 1995-2002



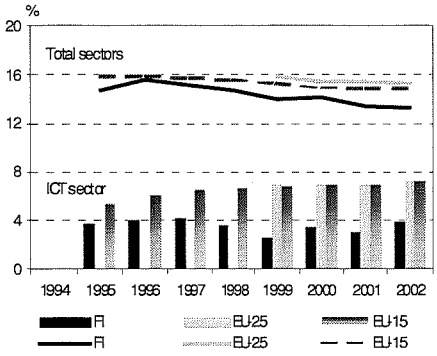
Source: EU LFS

ICT manufacturing and services employment -1995-2002



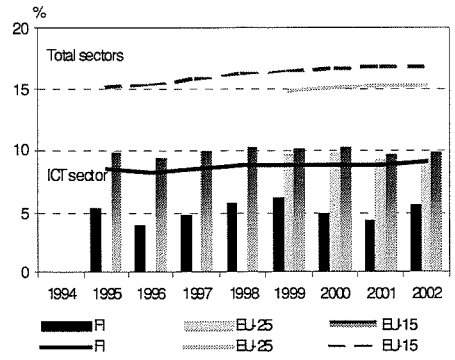
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



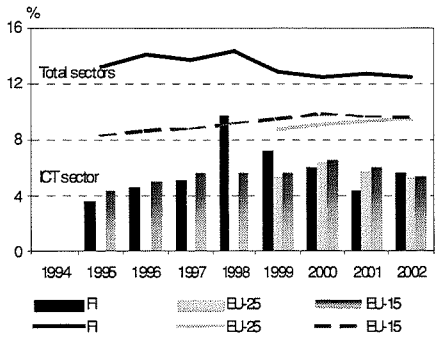
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



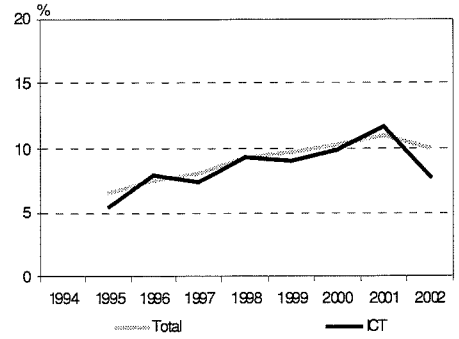
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

ICT employment is skewed more towards manufacturing than is the average in the EU: 36% of total ICT jobs.

Even though self-employment is in general as likely in Finland as in the EU, ICT workers are far more likely to be employees in Finland.

Lower than average levels of part-time employment are evident for ICT and the overall economy alike. Whilst, temporary contracts are far more likely in the overall economy than they are in ICT.

Job mobility follows a similar pattern for both ICT and overall, though mobility in ICT tails off in 2002.

Sweden

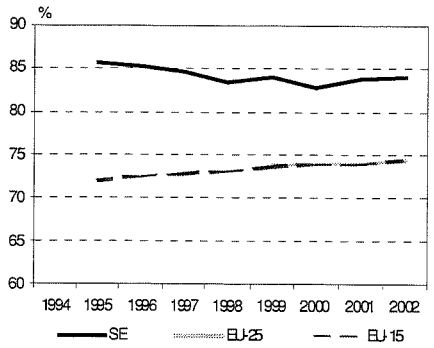
Sweden has one of the highest EU-15 activity rates, though it has fallen slightly over time. Over the same reference period, there has been a significant reduction in the unemployment rate in Sweden from just below 8% to around 4% in 2002.

The importance of ICT, meanwhile, has continued to develop. By 2002, 6% of total employment in Sweden was in the ICT sector.

Many of these jobs are held by men, however (66.5%) and nearly a quarter by men aged 25-34.

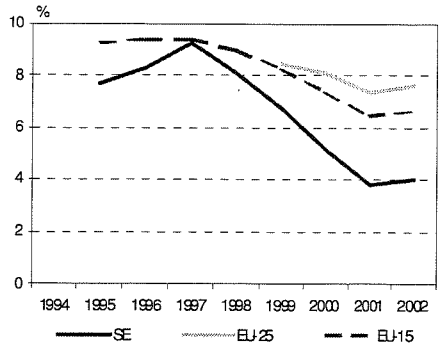
An average proportion of ICT jobs are carried out by the tertiary educated in Sweden (34%).

Activity rate in % - 1994-2002



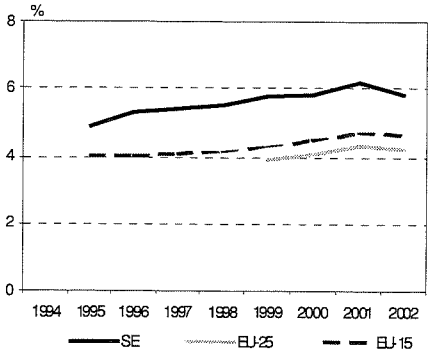
Source: EU LFS

Unemployment rate in % - 1994-2002



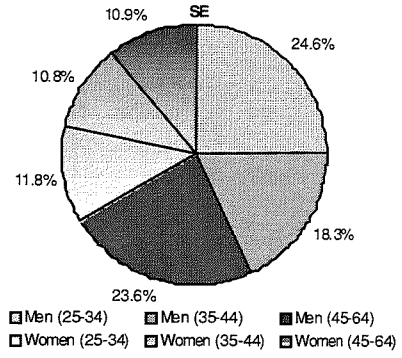
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



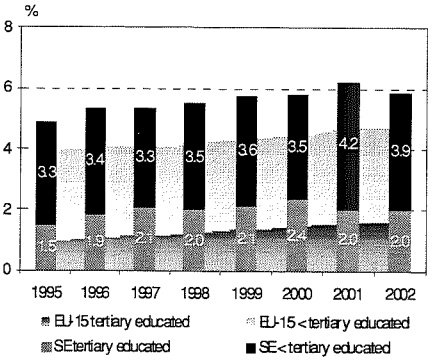
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



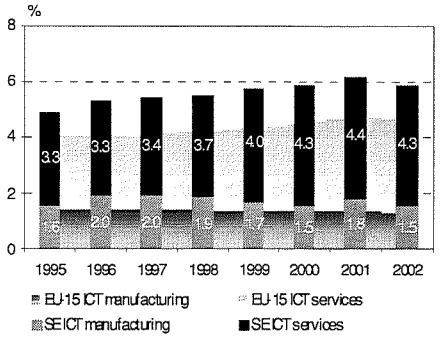
Source: EU LFS

Highly qualified employment in ICT 1995-2002



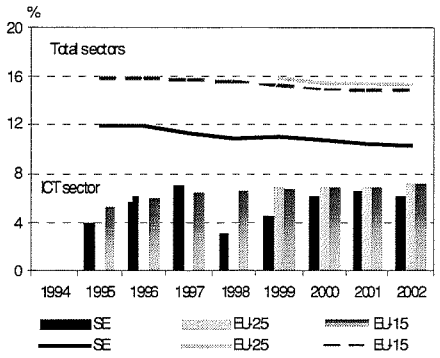
Source: EU LFS

ICT manufacturing and services employment -1995-2002



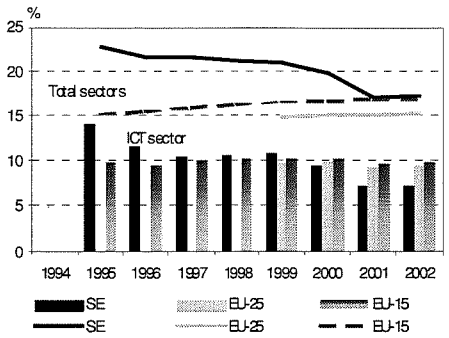
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



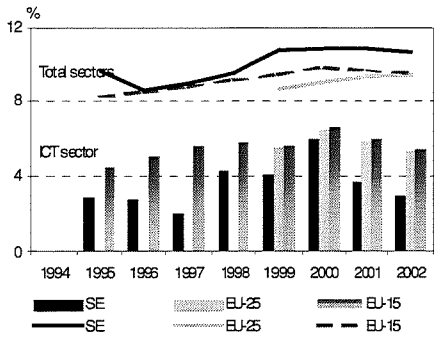
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



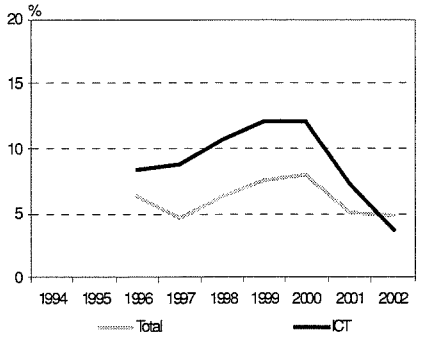
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

ICT employment is skewed towards the services (74% of total ICT employment).

Self-employment, though lower than average in the overall economy is at about the same level as the EU in ICT.

Part-time employment, which has fallen for both ICT and overall, is less likely in ICT in Sweden than in the EU.

Job-security is far higher in ICT in Sweden, where the proportion of employees on temporary contracts is just 3% in 2002.

Job-mobility in the ICT sector is higher than for the overall economy during most of 1996-2002, though has fallen for both.

United Kingdom

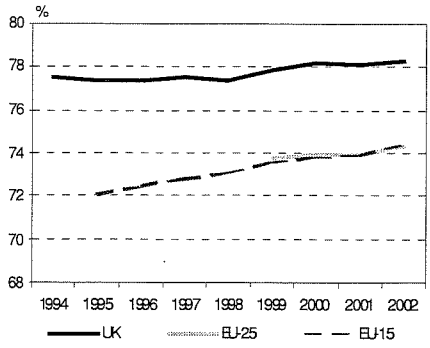
In the UK, the activity rate has been relatively stable between 1994 and 2002, where it stands at 78% or around 4% over the European average. The same period has seen the unemployment rate halved.

ICT employment has risen in all years but 2001-2002, by which time it accounted for close to 6% of all jobs in the UK.

The ICT sector is however very male dominated in the UK, where 74% of all ICT jobs are held by men. More men aged 25-34 work in ICT in the UK than women aged 25-64.

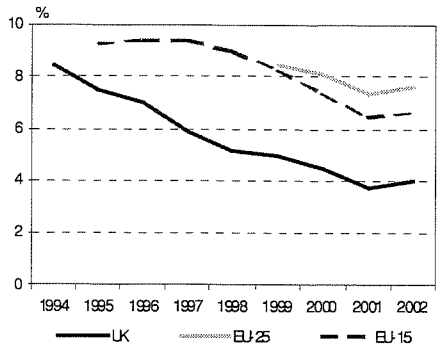
Whereas in the EU 34% of all ICT workers in 2002 had a tertiary level education, this was slightly higher in the UK at 36%.

Activity rate in % - 1994-2002



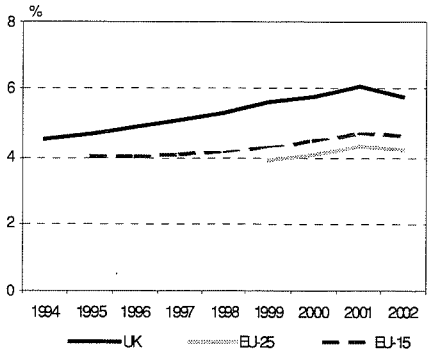
Source: EU LFS

Unemployment rate in % - 1994-2002
employment - 1994-2002



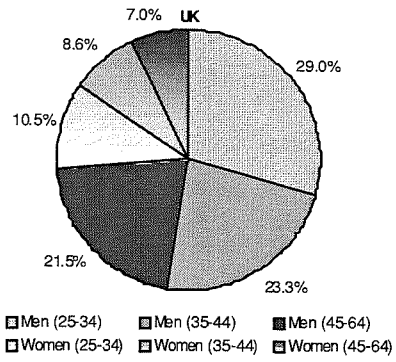
Source: EU LFS

ICT employment as a % of total



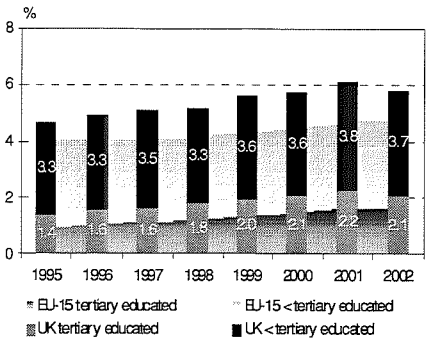
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



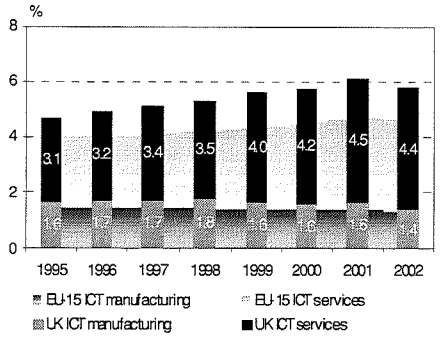
Source: EU LFS

Highly qualified employment in ICT 1995-2002



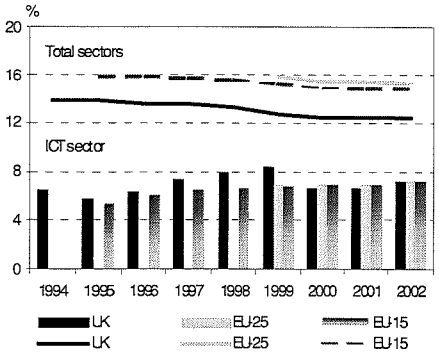
Source: EU LFS

ICT manufacturing and services employment -1995-2002



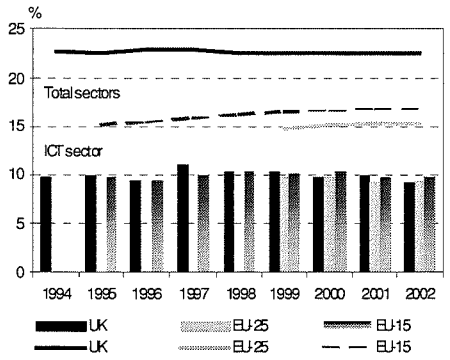
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



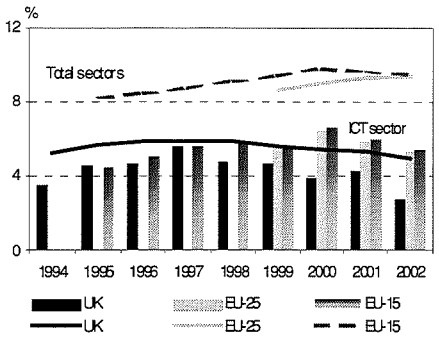
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



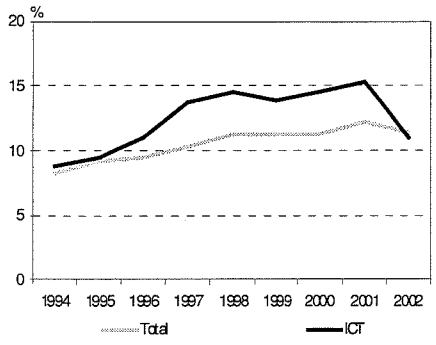
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

ICT jobs are geared towards services: 4.4% of all jobs in 2002 were in ICT services, or 76% of all ICT employment.

Though self-employment in the UK is below the European average for the overall economy, self-employment in ICT is at a similar level to the EU.

There is a high incidence of part-time employment in the UK in general, though this trend is not reflected in the ICT sector, where individuals are more likely to work full time. Fewer than average people have temporary contracts in the ICT sector and total economy alike.

Job mobility in the ICT sector has exceeded that of the total economy in all but 2002. At its high point, 15% of people employed in ICT changed jobs between 2000 and 2001.

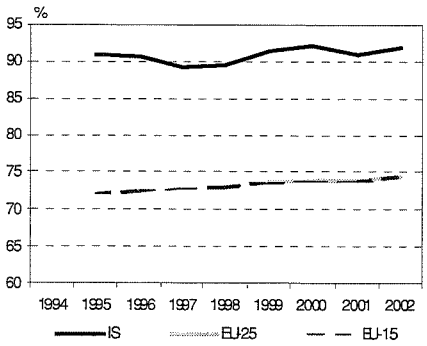
Iceland

The activity rate in Iceland is significantly higher than in the EU. It has remained relatively stable between 1995 and 2002 at around 91%. During the same period, unemployment has dropped from 4% to 2.3%.

The importance of the ICT sector has increased. Whilst in 1995, 2.9% of all jobs were in ICT, this had increased to 3.9% by 2002.

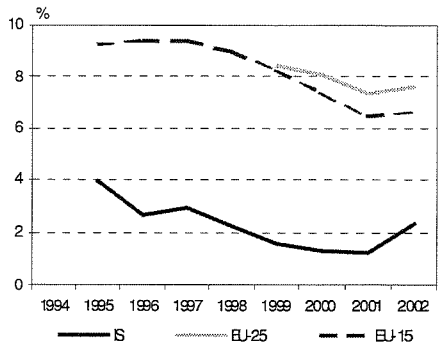
1.4% of all jobs in Iceland in 2002 were carried out by highly qualified individuals in the ICT sector. The proportion of people working in ICT that were tertiary educated in 2002 was 36%, just above the European average of 34%.

Activity rate in % - 1994-2002



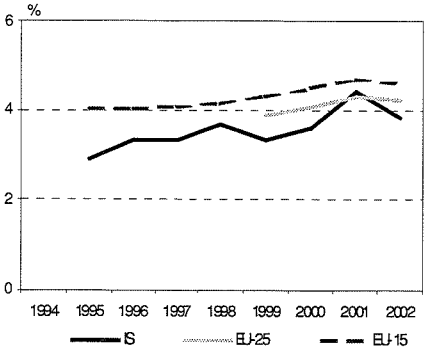
Source: EU LFS

Unemployment rate in % - 1994-2002



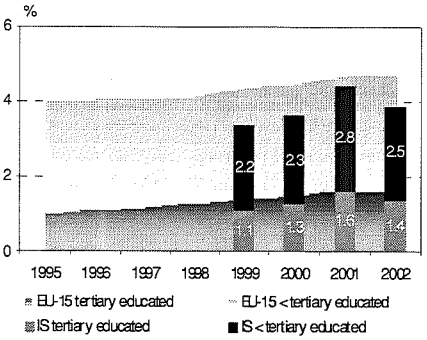
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



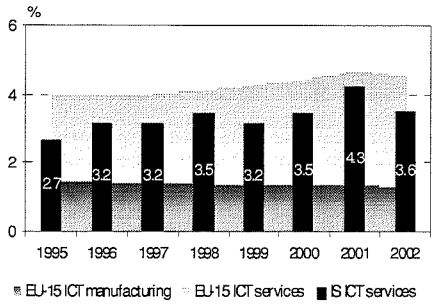
Source: EU LFS

Highly qualified employment in ICT 1995-2002



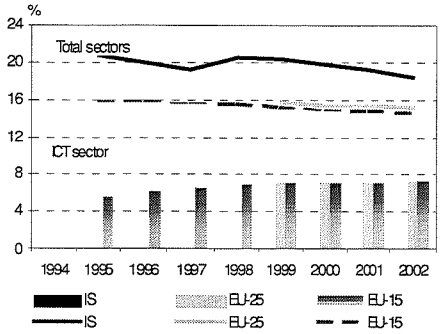
Source: EU LFS

ICT manufacturing and services employment -1995-2002



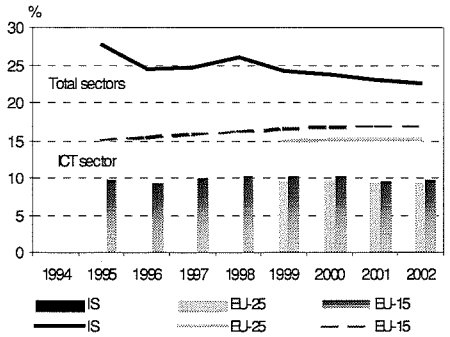
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



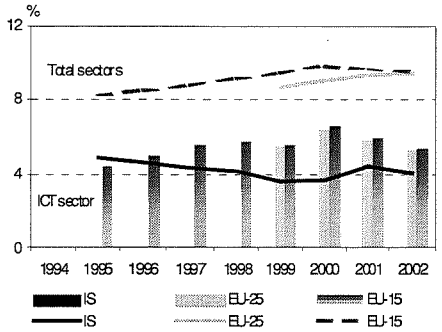
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



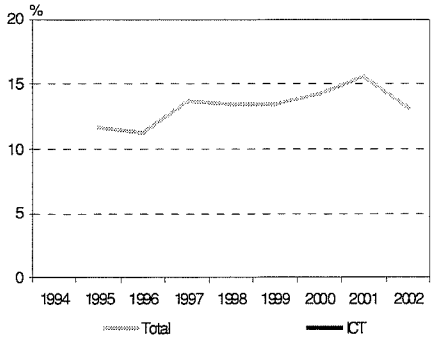
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

Reliable reporting of most sub-groups in the ICT sector is not possible. Taking the economy overall, however, self-employment is relatively high in Iceland. So too is part-time employment.

On the other hand, the existence of temporary contracts is some distance lower than the European average.

Job-mobility in Iceland has broadly increased between 1995 and 2002. At its high, 15% of the employed changed jobs between 2000 and 2001.

Norway

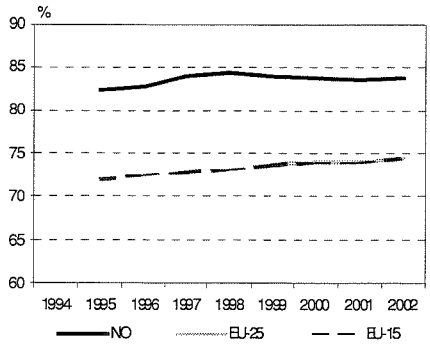
In Norway, the activity rate has remained relatively stable, though is significantly above the European average: around 84% compared to 74%. Unemployment has fallen between 1995 and 2002, though is up slightly on its 1999 low.

The importance of the ICT sector in Norway is at a similar level to the EU. In 2002, 4.3% of all jobs in Norway were in the ICT sector.

The ICT sector is heavily skewed towards men aged 25-34, who in 2001 represented around 29% of ICT employment.

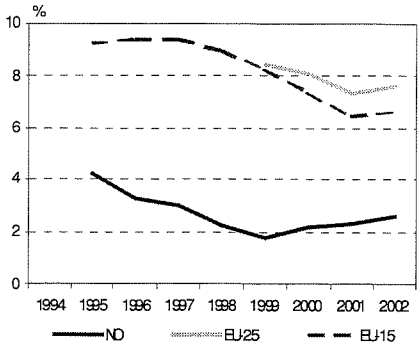
In 2002 over 50% of all ICT jobs were held by the tertiary educated.

Activity rate in % - 1994-2002



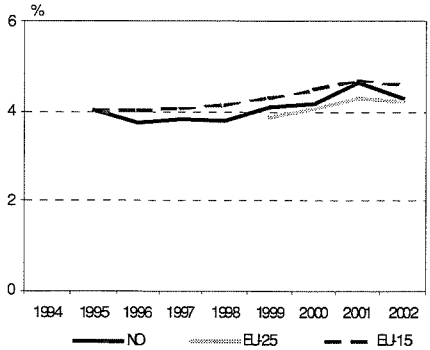
Source: EU LFS

Unemployment rate in % - 1994-2002



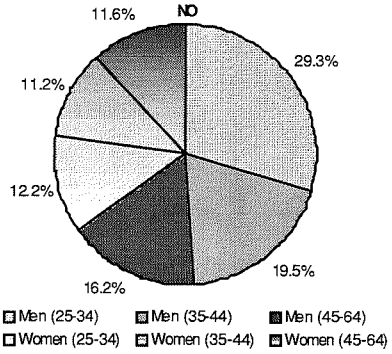
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



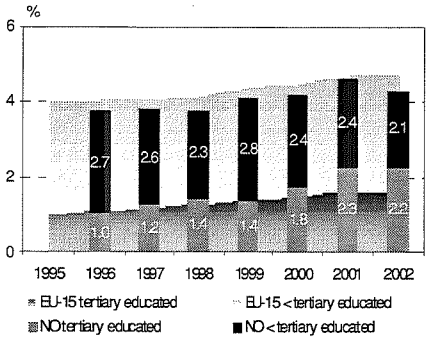
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



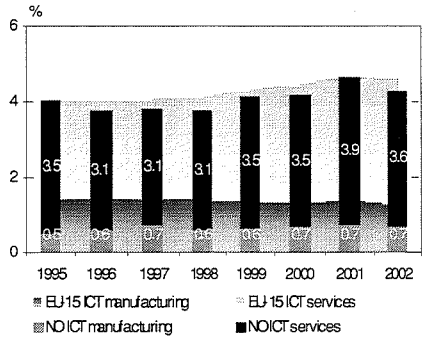
Source: EU LFS

Highly qualified employment in ICT 1995-2002



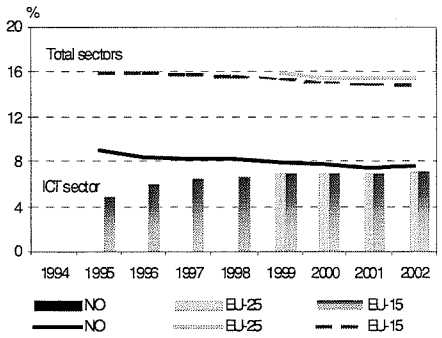
Source: EU LFS

ICT manufacturing and services employment -1995-2002



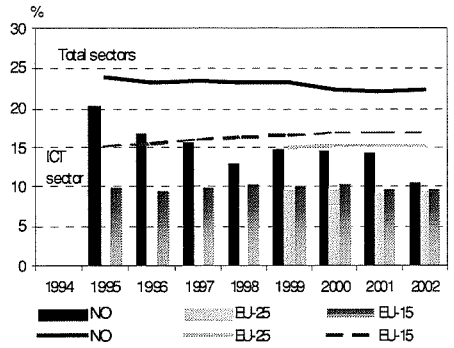
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



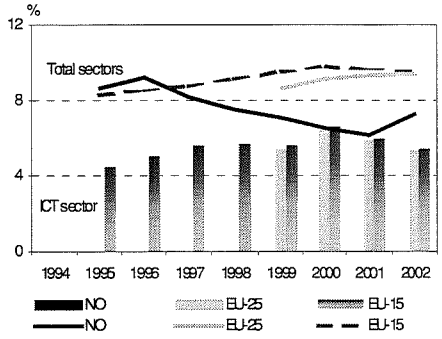
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



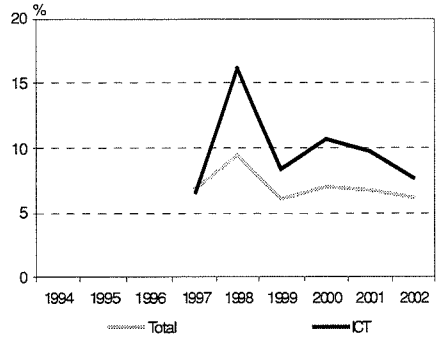
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

The ICT sector in Norway is heavily skewed towards services: 84% of all ICT jobs in 2002 were in services.

Reliable reporting is not possible for some sub-groups of ICT. However, there is a low level of self-employment in Norway overall (around 8% in 2002).

Part-time employment is higher than the European average for ICT and the total economy alike. Both have nevertheless fallen over time.

Job mobility in the ICT sector is higher than for the overall economy in Norway. In 2002, 7.7% of people had changed jobs in the ICT sector compared with 6.1% overall.

Switzerland

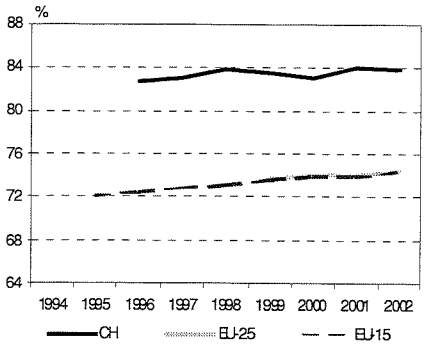
In Switzerland, the activity rate is close to 10% higher than the European average: 84% in 2002. Unemployment, which has generally fallen, stood at 2.6% in 2002.

The ICT sector employs an above average proportion of workers, and it is growing slightly. In 2002, 6% of all jobs were in ICT, compared with 5.4% in 1996.

Women working in ICT are more likely to be aged 25-34, whereas for men, who account for 65% of ICT jobs, it is the 35-44 year old age bracket that is most represented.

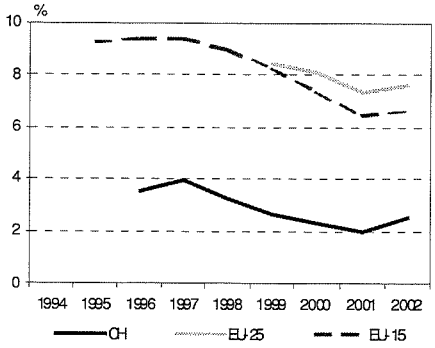
2% of all jobs in Switzerland are held by the tertiary educated in the ICT sector.

Activity rate in % - 1994-2002



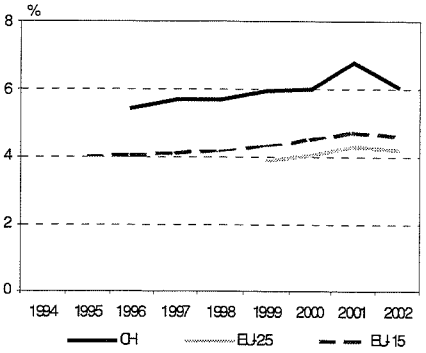
Source: EU LFS

Unemployment rate in % - 1994-2002



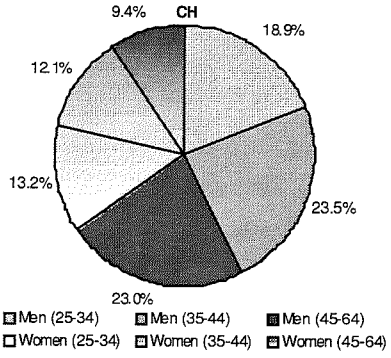
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



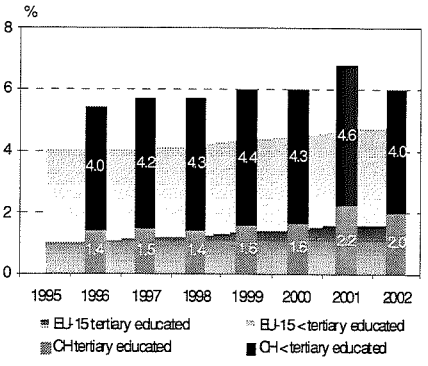
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



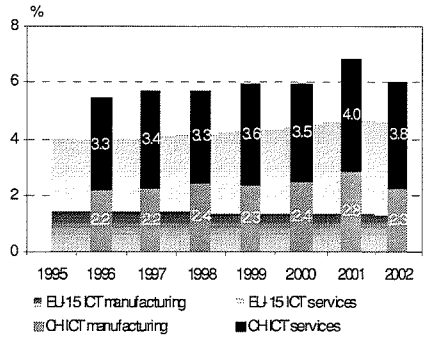
Source: EU LFS

Highly qualified employment in ICT 1995-2002



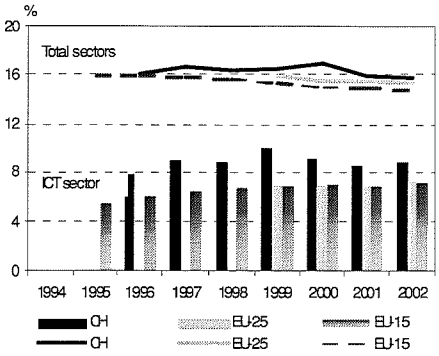
Source: EU LFS

ICT manufacturing and services employment -1995-2002



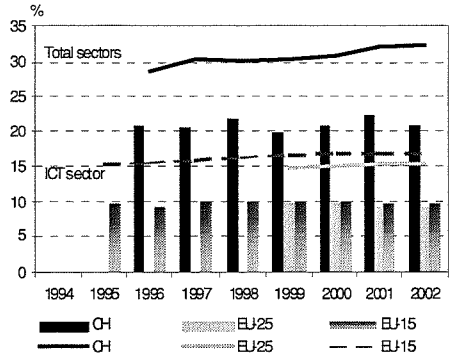
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



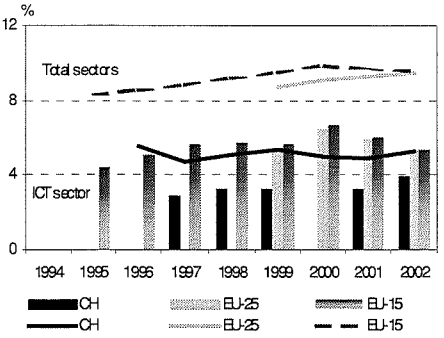
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



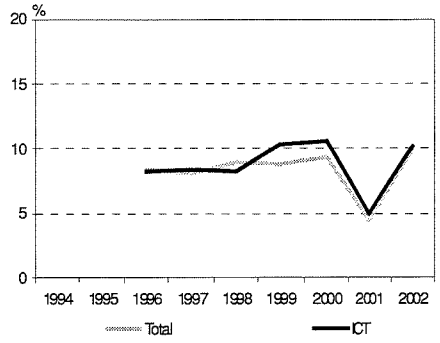
Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

National job-to-job mobility in ICT and overall 1994-2002



Source: EU LFS

ICT employment is skewed towards manufacturing, with 37% of all ICT jobs compared to a European average of 29%.

Self-employment though equivalent to EU levels for the economy overall, is higher in Switzerland in the ICT sector.

Part-time employment is significantly higher than the European average for ICT and the total economy alike, whereas the reverse is true for the likelihood of employees holding a temporary contract.

Job-mobility in the ICT sector has evolved with a similar trend to the economy overall.

Bulgaria

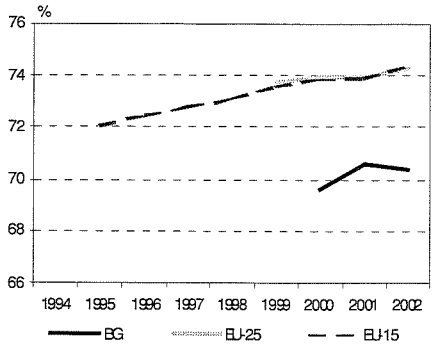
The relatively short time series for Bulgaria show an activity rate at around 4% below the European average in 2002. Despite this, unemployment was more than double the EU-25 norm in 2002 at 16.3% compared with 7.6%.

The share of ICT jobs in total employment was relatively stable, representing 2.8% in 2002.

Women hold more than half the ICT jobs in Bulgaria. Most, however, are in the 45-64 year old age bracket.

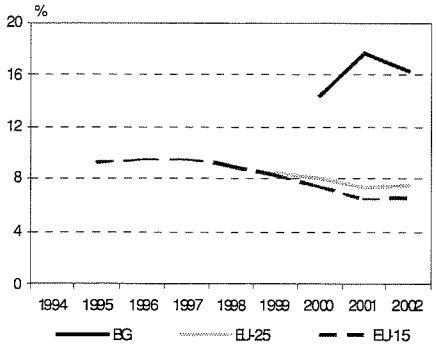
ICT jobs are more likely to be held by the tertiary educated than in Europe generally (37% compared to 34%).

Activity rate in % - 1994-2002



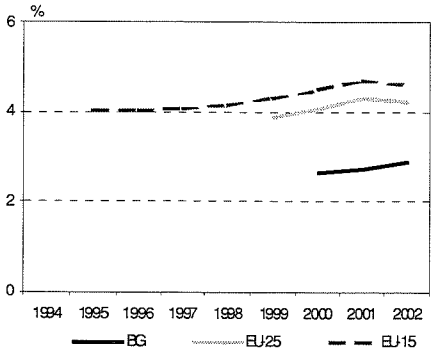
Source: EU LFS

Unemployment rate in % - 1994-2002



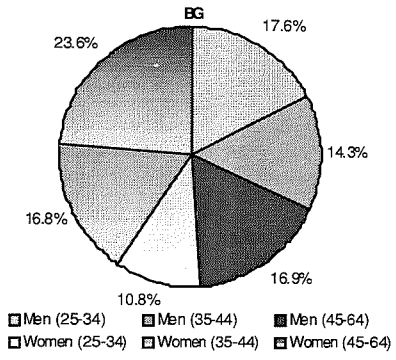
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



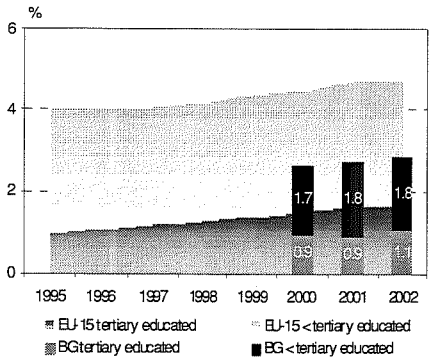
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



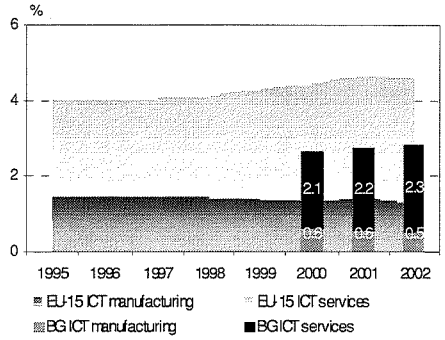
Source: EU LFS

Highly qualified employment in ICT 1995-2002



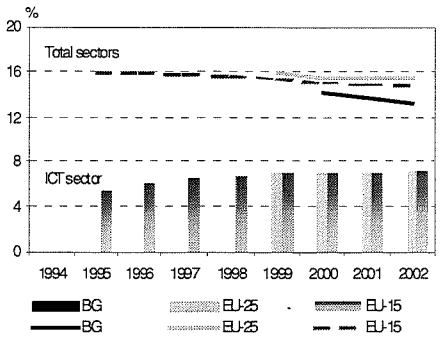
Source: EU LFS

ICT manufacturing and services employment -1995-2002



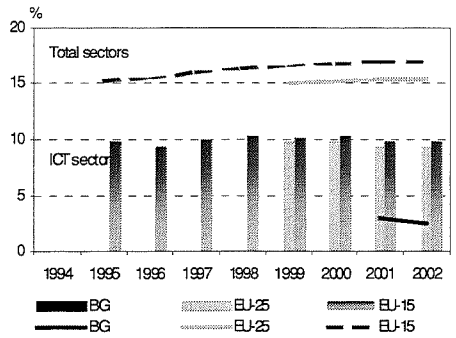
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



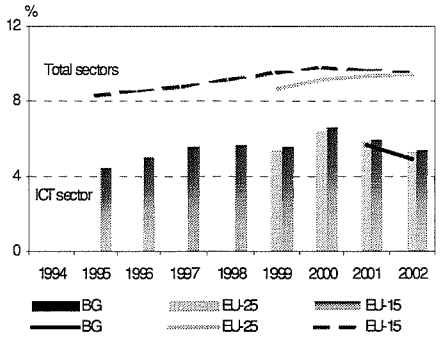
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

The ICT sector in Bulgaria is service-oriented, accounting for 82% of ICT jobs in 2002. This compares with a European average of 71%.

Reliable reporting is not possible for most sub-groups of ICT. However, there is a slightly below average level of self-employment in Bulgaria generally (around 13% in 2002) and significantly below average levels of part-time employment and employees with temporary contracts.

Romania

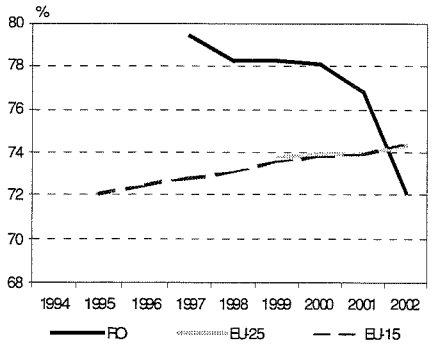
The activity rate has fallen sharply in Romania, representing 72% of the 25-64 year old population in 2002. At the same time, unemployment has risen from around 4% in 1997 to just under 7% in 2002.

The share of ICT in total employment has remained stable. In 2002, just 1.8% of all jobs were in the ICT sector.

Women hold over 53% of these ICT jobs, most being 25-34 years old. Male ICT employment is also skewed to this same cohort.

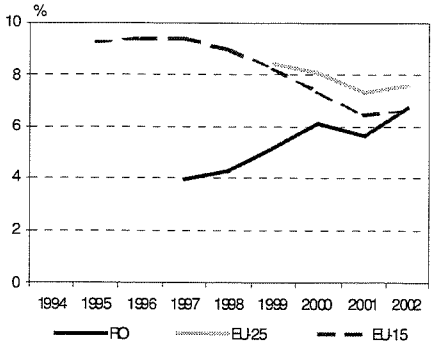
A below average proportion of ICT jobs are held by the tertiary educated (29% compared with 34%).

Activity rate in % - 1994-2002



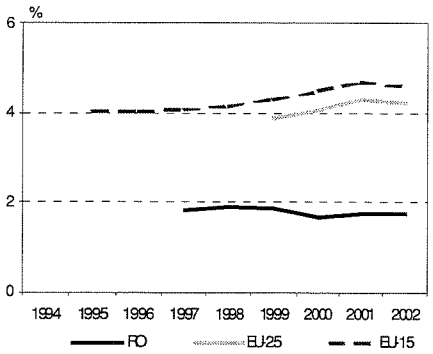
Source: EU LFS

Unemployment rate in % - 1994-2002



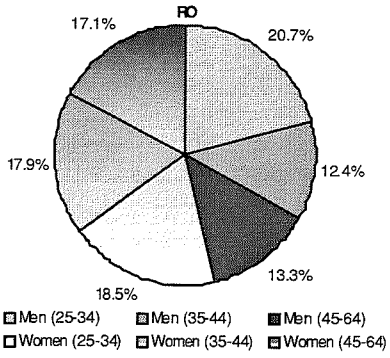
Source: EU LFS

ICT employment as a % of total employment - 1994-2002



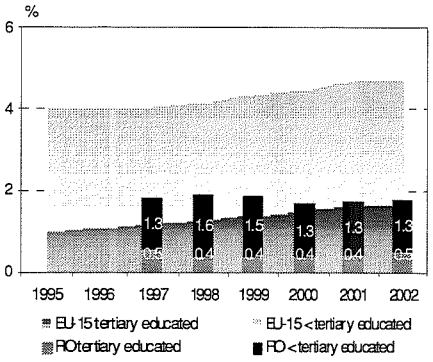
Source: EU LFS

Distribution of ICT employment by age and gender - 2001



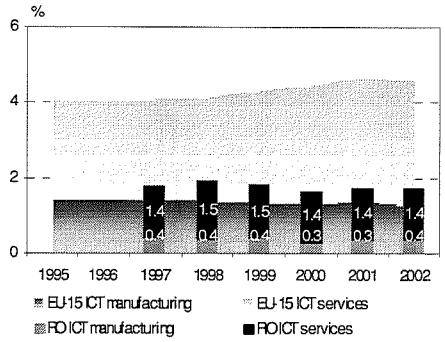
Source: EU LFS

Highly qualified employment in ICT 1995-2002



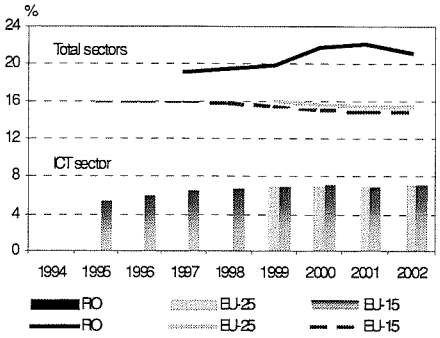
Source: EU LFS

ICT manufacturing and services employment -1995-2002



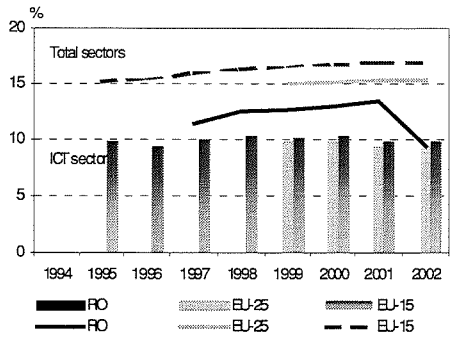
Source: EU LFS

Self-employment in % in ICT and overall 1994-2002



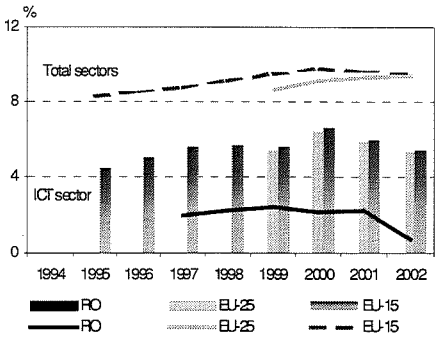
Source: EU LFS

Part-time employment in % in ICT and overall 1994-2002



Source: EU LFS

% of employees with a temporary contract - 1994-2002



Source: EU LFS

The ICT sector in Romania is service-oriented, accounting for 79% of ICT jobs in 2002. This compares with a European average of 71%.

Reliable reporting is not possible for the remaining sub-groups of ICT. However, there is an above average level of self-employment in Romania generally (21.3% compared with 15.3% for the EU-25 in 2002).

Below average levels of part-time employment and temporary contracts are evident in Romania.

Annex 2 / Methodological notes

The European Union Labour Force Survey

The European Union Labour Force Survey[24] is essentially a centralised way of collecting harmonised and comparable data. The main statistical objective of the EU Labour Force Survey is to divide the population of working age (15 years and above) into three mutually exclusive and exhaustive groups (persons in employment, unemployed persons and inactive persons) and to provide descriptive and explanatory data on each of these categories. The definitions of employment and unemployment used in the CLFS closely follow those adopted by the 13th International Conference of Labour Statisticians.

The technical aspects of the implementation of the survey are laid down in agreement with the National Statistical Institutes. On the basis of proposals from Eurostat, the Working Party on the Labour Force Sample Survey determines the content of the survey, the Community list of questions and the common coding of individual replies, as well as the principal definitions to be applied for the analyses of the results.

The National Statistical Institutes are responsible for selecting the sample, preparing the questionnaires, conducting the direct interviews among households, and forwarding the results to Eurostat in accordance with the common coding scheme.

The labour force characteristics of each person interviewed refer to their situation in a particular week. The survey is intended to cover the whole of the resident population, i.e. all persons whose usual place of residence is in the territory of the Member States of the Community, the EEA or the various candidate countries.

Definition of ICT used with Labour Force Survey data

The following definition of ICT is used for Labour Force Survey data:

NACE Rev. 1.1	Description
30	**Manufacture of office machinery and computers**
30.0	Manufacture of office machinery and computers
32	**Manufacture of radio, television and communication equipment and apparatus**
32.1	Manufacture of electronic valves and tubes and other electronic components
32.2	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
32.3	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods

24 This information and more can be found in Eurostat, 2001.

NACE Rev. 1.1	Description
33	**Manufacture of medical, precision and optical instruments, watches and clocks**
33.1	*Manufacture of medical and surgical equipment and orthopaedic appliances*
33.2	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
33.3	Manufacture of industrial process control equipment
33.4	*Manufacture of optical instruments, photographic equipment*
33.5	*Manufacture of watches and clocks*
64	**Post and telecommunications**
64.1	*Post and courier activities*
64.2	Telecommunications
72	**Computer and related activities**
72.1	Hardware consultancy
72.2	Software consultancy and supply
72.3	Data processing
72.4	Data base activities
72.5	Maintenance and repair of office, accounting and computing machinery
72.6	Other computer related activities

Note: NACE two digit level in bold text, ICT sectors in plain text, non-ICT but included in LFS definition of ICT level in italic text.
Source: Camire, Steunpunt WAV, 2003

General

In 1998, a new European Union Labour Force Survey: methods and definitions was published, with the effect of some changes on the structure and content of the survey.

Whilst data may in general be available for certain countries and years, it is possible that specific variables are not reported. For example, data on ICT employment may be available for the years 1994 to 2002, but data on education only for 1996 to 2002. As a result data on the educational level of ICT workers will only be reported from 1996 onwards.

EU-15 and EU-25 aggregates are estimated in 2002.

The EU-25 aggregate excludes Poland when the indicator refers to ICT since no two digit NACE data is available in Poland and therefore the ICT sector cannot be calculated.

No 2002 data is available for Germany and Luxembourg.

Breaks in series

BE	Break in series between 1998 and 1999 due to transition to continuous survey
EL	Break in series between 1997 and 1998 due to transition to continuous survey
IE	Break in series between 1997 and 1998 due to transition to continuous survey
IT	Break in series in 1998q1 due to revised estimates following census
LV	Break in series between 2001 and 2002 due to transition to continuous survey
LT	Break in series between 2001 and 2002 due to transition to continuous survey
NL	Break in series between 1999 and 2000 due to transition to continuous survey
PT	Break in series between 1997 and 1998 due to transition to continuous survey

SE Break in series between 2000 and 2001 due to transition to continuous survey
BG Break in series between 2000 and 2001 due to transition to continuous survey
RO 2002 lacks comparability with previous years due to significant changes in employment and unemployment definitions
BG Unemployment data lacks comparability between 2000 and 2001 due to changes in certain survey characteristics (questionnaire and sample design)

Activity rate in %

This is calculated on 25-64 year olds only.
The following formula is used:

$$\frac{\text{Employed + Unemployed}}{\text{Population}} \times 100$$

Unemployment rate in %

This is calculated on 25-64 year olds only.
The following formula is used:

$$\frac{\text{Unemployed}}{\text{Labour Force}} \times 100$$

ICT employment as a % of total employment

This is calculated on 25-64 year olds only.
The following formula is used:

$$\frac{\text{ICT employment}}{\text{Total employment}} \times 100$$

PL No two digit NACE data is available and therefore the ICT sector cannot be calculated.

Distribution of ICT employment by age and gender

This is calculated on 25-64 year olds only.

EE Sample sizes are too small to reliably reflect situation for some or all subcategories. Indicator is therefore excluded.
EL Data on 45-64 year old women should be treated with caution.
CY Sample sizes are too small to reliably reflect situation for some or all subcategories. Indicator is therefore excluded.
LV Sample sizes are too small to reliably reflect situation for some or all subcategories. Indicator is therefore excluded.
LT Sample sizes are too small to reliably reflect situation for some or all subcategories. Indicator is therefore excluded.
LU Sample sizes are too small to reliably reflect situation for some or all subcategories. Indicator is therefore excluded.
PL No two digit NACE data is available and therefore the ICT sector cannot be calculated.

PT Sample sizes are too small to reliably reflect situation for some or all subcategories. Indicator is therefore excluded.
SI Data should be treated with caution.
IS Sample sizes are too small to reliably reflect situation for some or all subcategories. Indicator is therefore excluded.
BG Data should be treated with caution.

Highly qualified employment in ICT

This is calculated on 25-64 year olds only.

CZ No breakdown by level of education is available in 1997.
DE Data is estimated in 1998.
EE Data should be treated with caution.
IE Data is estimated in 1998.
LV Data should be treated with caution.
LU Data is estimated in 1998.
PL No two digit NACE data is available and therefore the ICT sector cannot be calculated
SI Data should be treated with caution.
UK Data is estimated in 1998.

ICT manufacturing and services employment

25-64 year olds

EE Data on ICT manufacturing in 1998 and 2002 should be treated with caution.
CY Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
LV Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
LU Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
HU Data on ICT manufacturing in 1997-99 should be treated with caution.
PL No two digit NACE data is available and therefore the ICT sector cannot be calculated.
PT Data on ICT manufacturing should be treated with caution.
SL Data on ICT manufacturing should be treated with caution.
IS Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.

Self-employment in % in ICT and overall

This is calculated on 25-64 year olds only.
The following formula is used:

$$\frac{\text{Self-employed in sector } i}{\text{Total employed in sector } i} \times 100$$

DK Data on self-employed in the ICT sector should be treated with caution.
EE Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
EL Data on self-employed in the ICT sector should be treated with caution.

CY Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
LV Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
LT Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
LU Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
NL Data on self-employed in the ICT sector should be treated with caution.
PL No two digit NACE data is available and therefore the ICT sector cannot be calculated
PT Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
SL Data on self-employed in the ICT sector should be treated with caution.
SK Data on self-employed in the ICT sector should be treated with caution.
FI Data on self-employed in the ICT sector should be treated with caution.
IS Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
NO Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
BG Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.

Part-time employment in % in ICT and overall

This is calculated on 25-64 year olds only.
The following formula is used:

$$\frac{\text{Part-time employment in sector } i}{\text{Total employment in sector } i} \times 100$$

EE Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
EL Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
CY Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
LV Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
LT Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
LU Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
PL No two digit NACE data is available and therefore the ICT sector cannot be calculated.
PT Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
SI Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
SK Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
IS Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.

BG Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.

% of employees with a temporary contract

This is calculated on 25-64 year olds only.
The following formula is used:

$$\frac{\text{Employees in sector } i \text{ with a temporary contract}}{\text{Employees in sector } i} \times 100$$

DK Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
EE Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
EL Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
IE Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
CY Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
LV Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
LT Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
LU Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
PL No two digit NACE data is available and therefore the ICT sector cannot be calculated.
PT Data on temporary ICT employees should be treated with caution.
SI Data on temporary ICT employees should be treated with caution.
SK Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
IS Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
NO Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
CH Data on temporary ICT employees should be treated with caution.
BG Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.
RO Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.

National job-to-job mobility in ICT and overall

This is calculated on 25-64 year olds only.
The following formula is used:

$$\frac{\text{Employed in sector i in year t, employed in t-1 and with current employer} < 12 \text{ months}}{\text{Employed in sector } i \text{ in year t, employed in t-1}} \times 100$$

EE Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.

EL Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.

IE The working status of the individual one year prior to the survey is not reported from 1998 onwards, with the result that mobility can no longer be calculated.

IT The working status of the individual one year prior to the survey is not reported in 2002, with the result that mobility cannot be calculated.

CY Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.

LV Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded. In addition, the working status of the individual one year prior to the survey is not reported before 2001, with the result that mobility cannot be calculated.

LT Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded. In addition, the working status of the individual one year prior to the survey is not reported before 2001, with the result that mobility cannot be calculated.

LU Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.

NL The working status of the individual one year prior to the survey is not reported from 2000 onwards, with the result that mobility can no longer be calculated.

AT Data on the length of time the individual has been working with the same employer is unreliable from 1997 onwards, with the result that mobility can no longer be calculated. In addition, the working status of the individual one year prior to the survey is not reported from 1998 onwards.

PL No two digit NACE data is available and therefore the ICT sector cannot be calculated.

PT Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.

SI Data on ICT mobility should be treated with caution. In addition, the working status of the individual one year prior to the survey is not reported before 2000, with the result that mobility cannot be calculated.

SK Data on ICT mobility should be treated with caution. In addition, the working status of the individual one year prior to the survey is not reported before 2001, with the result that mobility cannot be calculated.

SE Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.

IS Sample sizes are too small to reliably reflect situation. Data on ICT is therefore excluded.

BG The working status of the individual one year prior to the survey is not reported at all, with the result that mobility cannot be calculated.

RO Data on the length of time the individual has been working with the same employer is not reported until 2002, with the result that mobility cannot be calculated.

Annex 3 / Country codes

Code	Country
BE	Belgium
CZ	Czech Republic
DK	Denmark
DE	Germany
EE	Estonia
EL	Greece
ES	Spain
FR	France
IE	Ireland
IT	Italy
CY	Cyprus
LV	Latvia
LT	Lithuania
LU	Luxembourg
HU	Hungary
MT	Malta
NL	Netherlands
AT	Austria
PL	Poland
PT	Portugal
SI	Slovenia
SK	Slovakia
FI	Finland
SE	Sweden
UK	United Kingdom
IS	Iceland
NO	Norway
BG	Bulgaria
RO	Romania

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